The Builder.

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The Institute and its Charter.

AS we predicted, there was an unusually large gathering of members and an unusually animated meeting at the Institute Rooms on Monday night, the attendance being augmented by the presence of a considerable number of provincial members who do not usually attend the meetings, and who came up especially to vote in support of the proposed new Charter and of the reformed by-laws, which, it is now understood by a kind of common consent, are to follow its adoption, and one object of which will be to give more direct opportunity to country members to take part in the management and policy of the Institute, by some system of voting by proxy or by letter. The Associate members, who are also led to expect an extension of their privileges as a result of the new Charter, also attended in considerable force. We do not imply, however, that either class of members were actuated in the main by a desire to look after their own interests merely; in fact, a distinct disclaimer of any such narrow view was made on their behalf in the course of the evening. This does not quite accord with the tone which some of the provincial members have employed in regard to the Institute and its Council lately, in papers read at meetings and in circulars sent round in their districts; but, on the whole, we believe there was a feeling that whatever movement rendered the Institute of Architects a more general and a more popular representative body must tend to strengthen its hands, and, by consequence, those of the profession generally, in regard to professional status and practice; and the main body of the Associate members, by the mouth of their chosen spokesman, Mr. Richards Julian, have shown themselves very loyal in spirit, and desirous to cordially support the Council in a general scheme of reform, without pressing too closely questions of detail. For all this, the adoption of the Charter was not carried, but only its relegation to a special committee for further consideration. This result was mainly due to the speech of Professor Kerr, who had, as we mentioned, given notice of a resolution objecting to the draft Charter generally, in order to secure its further consideration; and who may be congratulated, not only on having carried his point, but on having made a very witty and amusing speech, and imported a great deal of entertainment into what might otherwise have been a dull business discussion.

Without going into all the details of proceedings of a meeting which was nominally not a public one, we may take occasion to make one or two remarks on the subject of discussion. We do not think the result of the meeting is to be regretted; the matter in hand has to be settled definitely for some time to come; "a century" was the precise period named by two or three speakers, and apparently accepted by the meeting; after which period we suppose history may be expected to repeat itself. But we by no means concur in all the destructive criticism of Professor Kerr, amusing as it was to listen to, nor do we believe the provincial members would have been so much impressed by it as they apparently were, had they been aware of the learned Professor's peculiar aptitude for exhibiting the negative side of everything, which may be said to have been displayed, with more or less humour and effect, in regard to nearly every proposition that has been made in that room for a good many years back.

The reasons why a new Charter is proposed to be asked for were stated clearly, though at some unnecessary length, by Mr. Cole A. Adams, who moved the resolution "That this meeting do now proceed to consider the terms of the proposed Charter with a view to its adoption," and the real reasons resolve themselves into two. First, that when the original Charter was drawn up it was evidently contemplated that the Fellows would be the bulk of the Society, and the Associates only an additional but not numerous class; in short, it was a small affair then, of few members, and most of them men of some standing, and not young beginners. Under those circumstances it was natural enough that the Associate class should not have a vote. They were merely hangers on, not a part of the main body. At the present moment they are much the largest class numerically, and a large proportion of the revenue of the Institute comes out of their pockets. Accordingly, they demand power of voting equally with the Fellows, and it is apparently tacitly agreed that this power they ought to and are to have, with certain restrictions, as soon as the ground is cleared for fresh by-laws. That is the argument; upon which we have a word to say just now. Then it was pointed out by Mr. Adams that when the Charter laid down that members were to vote personally only,—"members present,"—the Institute was practically a metropolitan body, most of the architects of repute then living in London; whereas now there were members all over the country, paying the same subscription as town members, yet having practically no power to take part in or influence the concerns or the action of the Institute by the expression of their opinions at the meetings.

This last argument seems to us unanswerable; indeed, we can only wonder that provincial members have gone on paying their subscriptions uncomplainingly, or, at all events, without open and seditious complaint, for so long. If the Institute is really to represent the architects of the nation, and not of London only, it is absolutely imperative that its by-laws should be so revised as to give the provincial members a practical power at the meetings, instead of a mere shadow of membership; and this revision the old Charter leaves no power for. In regard to the other matter, the demand of the Associates for voting power without restriction (for that is what they say they ought to have), there are one or two words to be said. We should like to know how many Associates there are who are in a position to become Fellows, and who have not availed themselves of that privilege, and with what possible reason these gentlemen can claim to be put practically in exactly the same position as Fellows, while only paying the Associates' subscription? That is exactly what it comes to. The Council have intimated their readiness to give the Associates votes on all points except the passing of by-laws and the election of Fellows; and though the Associates have expressed themselves generally as content to accept this for the present, more than one of them intimated at the meeting on Monday that they still claimed equal votes on these points also. The claim is absurd A good many of the Associates are men acting as assistants to architects in practice; it is not likely that they are to be given the power to vote upon the election of their principals as Fellows. The claim is perfectly unreasonable, and if the Council of the Institute ever give way to what may be called popular clamour so far as to grant this d emand they will be lowering the whole status of the Institute. Equally absurd was the protest of an Associate, printed along with other notices that were circulated at the meeting, against "the arrangements by which Associates have no voice in determining the terms of the proposed Charter, or of the By-laws which are to be framed under it." The Council have no power to grant them any voice in it, for the simple reason that the old Charter is in force until the new one comes into operation, and its terms leave the Council no power to grant such a demand, if they wished it ever so much. The notice ought not to have been printed at all. To these comments we must add another, and a disagreeable one to be obliged to make. Although, as we have said, the main body of the Associates, who made Mr. Julian their spokesman, have behaved in a loyal and temperate spirit, the conduct of some of the members of this class at the meeting, in

making noisy interruptions, and even hissing when a proposal was made that a certain matter should be "left in the hands of the Council," offered plain proof that there are some among that body who are totally unfit to have the degree of power conferred on them which they ask for, and that even to give them a vote in any of the business of the Institute is a very doubtful policy. One of the Associate members remarked to us some time ago, "I would much rather be without the power of voting myself, than see it conferred upon some of the members of the Associate class": a view of the matter which we commend to the serious consideration of the Fellows.

In regard to Professor Kerr's attack on the proposed form of Charter, his first charge was that the new Charter did not recite the claims of the art of architecture in the same "noble language" as the original one, viz., that it is "an art esteemed and encouraged in all enlightened nations as tending greatly to promote the convenience of citizens and the public improvement and embellishment of towns and cities." The simple and obvious fact is that such a grandiloquent setting forth of the objects and importance of architecture is out of place and out of date; every one admits it: it was included in the old Charter at a time when architecture was not honoured or thought of as it now is, and when some such reasoning might have been thought suitable or necessary as a justification of the then novel step of granting a Charter for the incorporation of a Society of Architects. No one wants to be told that now; and a statement of the kind would simply have been unnecessary verbiage. The real point of Professor Kerr's objections lay in his remarks in regard to the unnecessary detail of many of the clauses, which included matters which would be more properly left to be dealt with and settled under by-laws. In this we think he was quite right, and the recommittal of the Charter will give an opportunity, we hope, for considering and pruning it, and rendering it what, as Professor Kerr truly says, a Charter ought to be, a document settling broad principles and leaving details to by-laws. Circumstances are constantly changing, both in the profession itself and in its relation to the public, and a Charter should be so drawn as to be as permanent a document as possible, in order to remain undisturbed as long as possible, and take all minor changes under its provisions in the more elastic and manageable form of by-laws. So far we concur in his criticism, and we think it well that the meeting accepted it and agreed to reconsider the form of the Charter. This reconsideration is to be entrusted to the Council, assisted by some independent members, who, after much discussion, were finally selected by the meeting, or, at least, the list of names formally approved by them. The members selected were Professor Kerr, Mr. Papworth, Mr. Ridge, Mr. Gough, Mr. Aldridge (President of the Liverpool Architectural Society), Mr. Holden (President of the Manchester Society), from the class of Fellows; Mr. Julian and Mr. Pink from that of Associates; and Col. Prendergast as representing the Honorary Associates. There was an endeavour on the part of the meeting to carry a vote that this combined committee should have power to deal with new by-laws and present them to the meeting at the same time, but this was negatived by a small majority, on the ground that if that were done we should only have the same result next time the draft Charter was submitted to a general meeting, that the meeting would be unable to get through the subject in an evening, and there would ensue another relegation to another committee.

The draft Charter as submitted last Monday, it may be observed, differs in some particulars, slight in words but important in bearing, from the draft printed in red, which was circulated a few months ago. The principal difference is that the expression, "the Institute" has been substituted for "the Council" in two or three places, the "rubric" draft having been, probably through oversight, framed far too much as if the Council were an irresponsible body. There is a clause in the present draft which errs in this sense, clause 35, which specifies that "the exercise of all powers exercisable by the Council shall be subject to the control of general meetings, but so that any act not expressly prohibited by the terms of this our Charter or of the by-laws made thereunder done by the Council before any resolution of a geeeral meeting shall not be invalidated by any such resolution." A more absurd and unmeaning clause it would be difficult to imagine, and if the Council really had the assistance of an experienced counsel in drawing up the terms of the Charter, it is difficult to understand what the legal mind was about when that clause came to be framed. It is absolutely contradictory in terms; worse than contradictory, it is immoral. It states in effect that the Council are subject to the control of the general meetings, that is to say, of the Institute at large; but if they are only sharp enough to steal a march on the general meeting, and pass any measure they wish, or take any step *before* consulting a general meeting, the latter loses its power to interfere! Perhaps that is intended as a bait to the Council, to keep them wide-awake. It would be difficult to find any other excuse for it. There is another proposition which seems absurd in a Charter, and that is the clause providing for the naming in the Charter of the first President, the First Vice-President, and the first Members of the Council. What has a Charter, in the first place, to do with the appointment of individuals to offices? Its function is to name what the offices are and define their powers, not to appoint the men to fill them; and, in addition to that consideration, this formal proposition to appoint the first President, Vice-President, and Council under the new Charter looks, as Professor Kerr happily remarked, very like "apostolical succession." Other matters in the draft form are obviously out of place in a Charter, but the appointing of the individual men who are to hold office is out of place even in a by-law.

In regard to other propositions which came in a desultory way before the meeting (the proceedings whereat were by no means very regular) was the proposal made, on the part of Mr. Aldridge, that the question should now be considered of amalgamating all provincial societies with the Royal Institute of Architects as one central body; and a proposition or resolution also stood in his name that a clause be inserted in the proposed Charter to give power to effect such an amalgamation whenever it may be deemed advisable. One special reason which he gave was that provincial architects did not see why they should belong to two societies,—could not conveniently do so in all cases,—and they felt it incumbent on them to support their local society first. No resolution was actually put, however, and no vote taken on this point, which was too large a matter to be considered at the moment. It may be well, perhaps (if it be possible so to do), to frame the terms of the Charter so as not to exclude the possibility of such a union; but there is something to be said on both sides in regard to the idea. It may be that not all the existing provincial societies are formed on lines which would suit the Institute principles. There is one society even in London which most certainly could not be accepted by or amalgamated with the Institute. The President of this same Society had a number of propositions down to a somewhat similar effect, including also provisions "that the draft charter be amended, and provision made for the reception of all *bonâ fide* architects"; and also, that "the Charter should provide for three classes of professional members,"—"(*a*) Associates whose only qualification shall be that they are architects, and honourable men; (*b*) members, who shall be the present class of Associates; (*c*) Fellows." As the present class of Associates are simply architects, the conclusion is that they are to be distinguished from class *a* as not being "honourable men." What is the hidden and sinister meaning of the reference to *bonâ fide* architects, we have been unable to make out, and the author of this remarkable set of propositions did not enlighten the meeting on the subject. A number of suggestions of verbal alterations made by Mr. Edwin T. Hall, one of the younger Fellows of the Institute, though not formally brought forward at the meeting, have nearly all, we believe, been adopted, or are intended to be adopted, by the Council, and the emendations testify to Mr. Hall's businesslike tone of mind and careful consideration of the subject.

Now that the subject has been partly ventilated and sent to a new committee, we may express a hope that the said committee will not let the grass grow under its heels. The more restless spirits among the provincial architects who have demanded reforms have constantly brought it up against the Institute that it promises a great deal and performs nothing. The not passing of the Charter last Monday cannot be laid at the door of the Institute officials, as it was the whole house which passed the resolution to "re-commit the Bill." But, if action is not prompt with it, the patience of provincial members, who are at present rather eager on the subject and desirous to work with the Council, will be again exhausted, and we shall hear again the old complaint that the Institute never does anything, but only talks of doing it: a complaint which in times past has certainly not been made without foundation. There is an opportunity to give a great impulse to the usefulness and influence of the central associated body of architects; let it not be lost through any unnecessary delay and procrastination.

THE PROPORTION OF THE HUMAN FIGURE.*

BY CHARLES ROBERTS, F.R.C.S.

THE recovery of many antique statues, and their preservation in our museums, and the numerous reproductions of them in plaster, has rendered the study of human proportions on the lines of Classical and Renaissance times of little interest to us, as we find in these antiques models of perfection which are rarely met with in nature, and to which most of the old formulæ may be applied, or from the measurement of which new ones may be constructed. Of the more recent and useful *memoria technica* of this kind is the triangular diagram (fig. 1) constructed by Gibson, the sculptor, the application of which is very simple when its details have been properly mastered.†

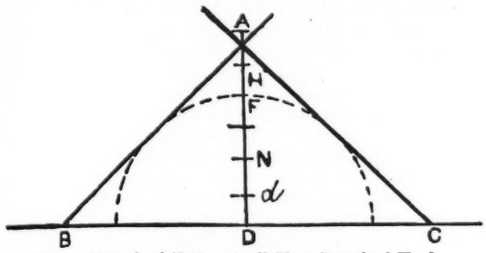
The principal objection to all these empiric and artistic methods of determining the proportion of the body is that they apply only to the adult or mature form of the body, and have been deduced from a too limited range of observation. The proportion between the head, the foot, or the hand, and the other parts of the body differ at different ages, and under different conditions of life. In the infant, for instance, the head forms a fourth, and not the seventh or eighth part of the stature, as in the adult; and similar irregularities occur in all other standards derived from portions of the body: hence the necessity and importance of establishing the proportions of the bodily frame for each sex, age, and condition of life, by some method which applies equally to all of these conditions,—in short, by actual measurement with instruments of great precision. This is the scientific method known by the name of anthropometry. This method consists of the accumulation of a large number of measurements of every measurable part of the body as it exists under the different conditions referred to, and eliciting the *mean* or typical form,—the central or common form of Reynolds,—by striking averages, and thus eliminating by "reiterated experience," the "blemishes and defects" which Reynolds tells us are associated with all the objects which nature exhibits to our view. By this means "we correct nature by herself, her imperfect state by her more perfect, and make out an abstract idea of form more perfect than any one original." The only difference between Reynolds's method and the scientific method is that Reynolds trusts to "an eye long used to

* Continued from p. 743, *ante*.

† For a description of this diagram, see Bonomi's "Proportion of the Human Figure," p. 11.

the comparison of human forms" and the scientist to his instruments, to find out what a set of objects of the same kind have in common, and what each of them wants in particular. The scientific method fully confirms Reynolds's statement that there is one general form which belongs to the human kind at large, and several classes which might be characterised as the Apollo, the Gladiator, and the Hercules types, if we were not afraid to use such a high-sounding classification.*

But the science of anthropometry does not embrace the whole of Reynolds's theory of proportion. There are subtle qualities about beautiful human forms which the measuring-rod and callipers cannot gauge, and which can be determined only by the eye and the conception which it excites in the mind. This is what I have already referred to as the quality so highly developed in the Greeks as the mental faculty of proportion. It was by a "glance of the eye,"—"the eye long used to the comparison of forms," that they were able to excel the Egyptian sculptors, and to supersede their mechanical methods, and it is no doubt the same faculty which determines the good or bad work of artists and sculptors of our own day. Many efforts have been made, both in Renaissance and modern times, to formulate systems which would interpret this faculty of proportion chiefly on geometrical lines, like those of Story and Hay,† whose works are well known to all students of this subject. But since the publication of "The Origin of Species" few persons can be found who believe that the human body was developed on geometrical plans, however much it may seem to conform to them, and they must be abandoned. The theory of proportion propounded by Zeising, of Berlin, appears to me, as far as I have been able to examine it, to be deserving of more attention than it has received in this country, and it is the more interesting, as it is equally applicable to architecture and other objects of art and nature as to the human form. Zeising's rule of proportion may be rendered thus: "If the division of a whole, made up of unequal parts, appear proportional, the smaller part must be in the same relation to the larger that the larger is to the whole; or, in other words, the whole must be to the larger part in the same ratio that the larger is to the lesser." The above simple diagrams (fig. 2) will illustrate the application of the rule of division of a line into proportional parts, and their subdivision into smaller parts with similar proportions. The divisions are effected under the geometrical rule of extreme and mean ratio.



D N = Length of Neck. | D H = Length of Head.
D F = " Face. | D A = " Foot.
D d = $\frac{1}{10}$ of Total Stature.

Fig. 1.

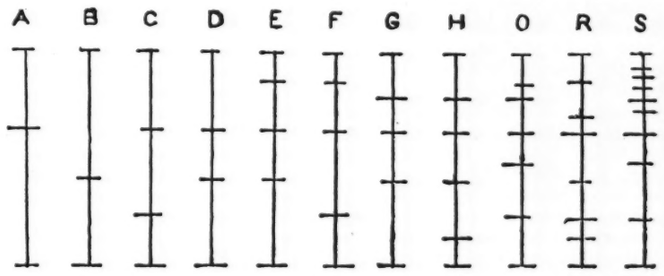


Fig. 2.

We shall be better able to understand the law if we take one of Zeising's examples of its application to the human form. First, with respect to the entire body. The most natural division of the body into two parts is to divide it through the umbilicus or waist, then the larger portion will be the lower part. Now, if we take the entire height, say, of the Apollo Belvidere as 1,000, the part below the navel is 618, and the upper part 382, and as 382 (the smaller part) is to 618 (the larger part), so is 618 (the larger part) to 1,000 (the whole); or, as 1,000 is to 618, so is 618 to 382. Again, the law applies to the head, if we make the division on a line with the eyebrows. The proportion for the whole head of the Apollo is 146 (the total stature being 1,000), and the face is represented by 90, and the part above the eyebrows by 56. The law shows that the entire arm bears the same proportion to the forearm (the division being at the elbow) that the forearm (the larger portion) does to the upper arm. The whole limb is 438, the forearm and hand being 271, and the upper arm 167. The hand follows the same rule, if we make the division at the knuckles; the fingers are 39, and the remainder of the hand 24,—the total length being 63. In the lower extremity the same relative proportions exist (the division being at the knee), the whole limb being 382, the upper portion is 236, and the lower 146. Lastly, the foot being 90, the larger portion equals 56 and the smaller 34. Those who desire to know more of the application of this law of proportion must consult Zeising's interesting work,* but as an example of its practical character I will give an illustration of its application to the draped as well as the undraped human form. Ladies' dress reformers, and especially those who pretend to some anatomical knowledge, commit a grave error when they attempt to compare the rigid, rounded form of the nude antique statue, with the limp ever-changing forms of the draped figure, and argue therefrom the one should be accepted as the model for the other. No such general comparison is possible, and all that is possible or necessary is that Zeising's rule of proportion should be adhered to in the natural division and sub-division of the stature.

The set of figures (fig. 3) show the parts of the draped figure which correspond with the proportional divisions on the antique statue,† and which require to be emphasised; namely, the waist (or rather the projection of the hips), the knees, the shoulders, and the top of the head. The waist (*pace* the dress reformer) marks the primary division, as in the above diagram (A), and in the statue and Figs. A′ and F′. If this division is disregarded the proportions must be reversed, and the secondary division at the knees must be made the primary division (diagram B) and be emphasised either by a short skirt, as in

— A′ B′ C′ F′

Fig. 3.

* For further details of the scientific method of studying the proportions of the human figure I must refer the student to Quetelet's "Anthropometrie," and my own "Anthropometry."

† Hay's theory is that a form is beautiful when the space which it encloses can be analysed into angles which bear proportions to each other analogous to those which subsist between the notes of music. The basis of harmony is, that when sounds mingle agreeably, the vibrations of which they are severally composed bear such relation to each other as is capable of a very simple numerical expression. Thus the octave is 2 to 1, the dominant 2 to 3, the mediant 4 to 5. All the harmonies are composed of whole numbers in relation to the unit, as $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{4}{5}$, &c. These harmonies again correspond to the points or nodes at which a string in vibration spontaneously divides itself. See the "Geometric Beauty of the Human Figure Defined," &c., by D. R. Hay.

* Neue Lehre von den Proportionen des Menschlichen Körpers, &c. Von Dr. A. Zeising. Leipzig: 1854.

† In designing these figures I used the statue as a lay-figure to hang modern drapery on, but the artist has improved on my plan and represented them as human figures. The waist of the statue is a little too small, and that of the next figure a little too large.

young girls, or by tightening the long skirt about the knees, as was the fashion a few years ago, and as represented by Figs. B′ and C′. It must be borne in mind, however, that the squeezing in of the waist by tight-lacing will not produce the proportional effect, as Zeising's law requires that the rounding of the hips must be in the position represented by the values 613 to 387, or very nearly in the proportion of three for the lower and two for the upper part of the body. Differences of stature in adults are chiefly dependent on the length of the lower limbs, and the reason why tall women generally look graceful and short ones often do not, is due to the fact that the primary division in the latter is too near the centre of the body; and this disproportion is often further increased by the wearing of tall hats, under the mistaken notion that it adds to the apparent stature of short persons, while, in truth, it removes the waist, or primary division, still nearer the centre of the figure. It is obvious, moreover, that tight-lacing, which is often resorted to (unconsciously, no doubt) by persons of short stature as a remedy for this defect, is no remedy at all, but renders a defect more conspicuous, which otherwise might not be noticed. Art is therefore in accord with science in discrediting tight-lacing. Tall persons have no need for it, and short ones are disfigured by it, and it is always injurious to health.

The literature relating to the proportions of the human figure is very voluminous, and I have collected references to no less than 190 works and essays, from the time of Pliny downwards. The subject is of as much importance from a physiological and sanitary as from an æsthetic point of view; but in this aspect it will be of little interest for the readers of this journal, and I must therefore omit any reference to it.

NOTES.

THE three competition designs for the Liverpool Cathedral, by Messrs. James Brooks, Bodley & Garner, and W. Emerson respectively, were sent off from London, we believe, on Saturday. They will make, when exhibited together, as we have no doubt they will be, a fine show, and one which will reflect credit on the energy as well as the architectural ability of the competitors, who have all produced their drawings with a completeness and effect worthy of so great an occasion as the building of a cathedral for one of the largest and most influential cities in the kingdom. We have had the pleasure of seeing all the designs; but, in compliance with the wish of two at least of the competitors, we decline to say anything about them until they become public property by exhibition.

THE recently-decided case of the Metropolitan Board of Works *v.* Nathan must not be regarded as laying down a precedent. The question there simply was whether an entrance-way from Emmett-street to some blocks of artisans' dwellings was a street within the meaning of the Metropolis Management and Building Act Amendment Act, 1882, section 8. As we understand the case, there were originally warehouses on the site of the dwellings, and such warehouses were approached by an entrance 10ft. in width, and had a yard beyond it. When the dwellings were erected there was a covered archway and a courtyard, which was said by the Board of Works to be a street. The judges, in deciding that this was not a street, took care not to give any definition of the word, explaining that what was a street was a question of fact. This courtyard was used for the sole purpose of entering these dwellings, and the public had no right there at all; therefore it may not be unreasonable to say that, at any rate, one of the elements of a street is that there shall be a public right of way therein. Of course a way may be a street which is a *cul-de-sac*, and therefore a public right of way through a roadway is not essential. From time to time difficulties of this kind must necessarily arise in regard to Acts of Parliament which are not very precise.

THE Governors of the Charterhouse have given notice of their intention to introduce a Bill into Parliament to enable them to sell, exchange, and dispose of or grant building or other leases of the remaining portion of the Charterhouse, to remove buildings and to dispose of the materials, and to apply the proceeds of any sale or rents to confirm leases already granted. It is also proposed to repeal so much as may be necessary of the Act affecting the Hospital passed in the third year of the reign of King Charles I. and the Act 30 & 31 Vict., chap. 8. This is, in fact, the death-knell of one of the most interesting groups of buildings in London, the Charterhouse of the old Carthusian monks, of Sutton, of the Dukes of Norfolk, of Thackeray. It is proposed to remove the charity from London, and to drive a new street through the grounds from Charterhouse-square to Clerkenwell-road. Howard House, which was formerly the residence of the Dukes of Norfolk, and the fine dining-hall of the poor brethren, are proposed to be spared. The scheme has been for a long time in preparation, and the plea for the destruction of the Charterhouse is the insufficiency of the income of the Charity estate.

WITHIN six months no fewer than twenty-seven workmen have lost their lives whilst engaged in constructing the new and extensive Croton aqueduct, at New York, which was commenced in May last. In spite of this, it is maintained that every precaution had been taken for the safety of the workmen. There have likewise been upwards of thirty-five other accidents, which, though more or less serious, have not resulted in actual loss of life. American critics regard this list of casualties as comparatively small, since they say there are not less than 10,000 men employed on the works daily. Our Yankee cousins are, however, in the habit of taking such calamities much more coolly than is usual on this side of the Atlantic.

A NEW YORK scientific journal gives an account of some experiments recently made as to the explosive character of carbon dust; a matter of no little importance with reference to those fatal explosions which are, unfortunately, but too common in all bituminous coal-mines. The explosive action which is known to be rendered possible by the admixture of ordinary coal gas with atmospheric air depends, as matter of proportion to some extent, on the chemical condition of the gas so mixed. Thus, according to German experiments, atmospheric air forms an explosive mixture with 6·7 per cent. of its volume of Munich gas, but is non-explosive with 6·25 per cent. of the same. With Carlsruhe gas, again, mixtures were uninflammable up to 7·5 per cent. of gas. When, however, charcoal dust is mixed with gas and with atmospheric air, ignition takes place much more rapidly; and in certain proportions, the law of which it is most important clearly to ascertain, spontaneous combustion is said to occur. With a mixture of from 3·5 to 7 parts in volume per cent. the whole mass rapidly takes fire on contact with a flame; but when the proportion of gas and carbon dust is as low as 2·4 per cent. the mixture will not ignite. The point, however, of most interest for our own coal-miners is, not so much the inferior limit of combustible mixtures, in which the gas, which gives warning of its presence by the smell, may be more or less laden with coal-dust, as the phenomena,—if such are really established,—of spontaneous combustion under any ascertainable circumstances. That the admixture of carbon dust may render a much smaller volume of gas explosive when mixed with air than would otherwise be the case, may be regarded as highly probable. But that any, and if any what, admixture of the kind should generate spontaneous explosion is a contingency of which it is of the utmost importance to ascertain the possibility or impossibility.

FRENCH architecture has just lost its senior representative in the person of Théodore Labrouste, architect and honorary chief of the "Assistance Publique," winner of the Grand Prix de Rome, Vice-President of the Société Centrale des Architectes, and officer of the Legion of Honour. He died in Paris on the 28th of November, in his eighty-seventh year. Th. Labrouste, to whom the Parisians owe the remarkable "Maison Municipale de Santé," in the Faubourg St. Denis, was the elder brother of the celebrated Henri Labrouste, the architect of the great hall of the Bibliothèque Nationale and of the Bibliothèque Ste. Genevieve, who died in 1879.

THE Society of Painters in Water Colours held the private view of its winter exhibition last Saturday. The exhibition is not equal to some that we have seen there. Mr. A. Hunt contributes only two small sketches, one of which, however,—a study (169) for his drawing of "Warkworth," which has been seen on another occasion in the same room,—is a very fine example of the class of work to be properly called a "study or sketch." Mrs. Allingham is more sparing than usual of her work, and her figure studies are not as interesting as usual; but there are one or two beautiful little landscape studies with her name to them. Mr. Albert Goodwin contributes some most delicate and beautiful works, especially "Streatley, Thames" (54), which seems a glimmer and shimmer of real light, rather than the work of pigments; and his "Requiem" (174) is a beautiful little painted poem. His drawings are marked by his usual variety of style and effect. Mr. Eyre Walker is one of the best contributors of landscapes. Mr. Thorne Waite has some fine studies; Mr. Glindoni's "The Mathesis" (55) is a brilliant, though rather *clinquant* piece of work. Among other contributors are Mr. Wilmot Pilsbury, Miss Clara Montalba, Mr. H. Marshall (some very fresh and true studies of river-side scenes); Mr. C. Gregory, who shows in "The Fringe of the Common" (20) and "In Quimperlé" (12), very fine and thorough work in two subjects of a very different class; Mr. T. J. Watson; Sir John Gilbert, and other well-known contributors; but there is rather a want of special interest in the exhibition, compared, that is to say, with others which have preceded it. A melancholy interest attaches to the screen of small drawings by "the late Mrs. Mary Forster Lofthouse," whose first contributions as a new member, Miss Forster, we were admiring in the same room only a very short time back.

THE Dudley Gallery Exhibition of Cabinet Pictures in Oil is a better one than some we have seen there lately, and contains one noble work, Mr. Shaw's sea-piece, "Steyle Cove, Salcombe, South Devon" (24), a piece of roaring and foaming sea-water that is wonderfully real. "Wanted, a Governess" (28), by Mr. C. B. Yates, and "The Way of the World" (42), by Mr. Weekes, are among pictures with a point in them, the latter a study of geese criticising a donkey in a pound. "Cut off with a Shilling" (56), by Mr. E. Blair Leighton, is a good piece of painting, which tells, however, no story. "Spanish Head, Isle of Man" (81) is one of the best things Mr. Edwin Ellis has done. "Moonrise" (115), by Mr. Waterlow, is a remarkably luminous little work; Mr. Couldery's cats in "comfortable quarters" (204), look as if you might stroke their fur the wrong way with the usual results. There are other good works: also some unreasonably bad ones.

THE Royal Institute of Painters in Oil (as it becomes in the winter) opened its doors as usual simultaneously with the Society of Water Colours. Among the notable works in the collection is Millet's "The Grand-daughter" (450), the title being a mere name for a painting of an interior with two figures, for which the spectator may make any story he pleases, but which is a work of unusual artistic interest in colour and composition. Mr. Stock's "Hesperus" (342) is an ideal study of the kind to which he has devoted himself; slight but very pleasing. There can hardly be said to be any remarkable works in the collection, which, as usual, is a large one numerically,

including a good deal of work of very moderate interest. Among paintings to be looked at are "The Chart," by Mr. Napier Hemy, a cabin interior (13); sundry landscapes by Mr. E. Hargitt, somewhat mannered but powerful; "Notre Dame, Paris," by Mr. T. R. Way (128), a moonlight study; "A Prisoner of State" (131), by Mr. Dendy Sadler; "The Complete Angler" (145), by Mr. E. Stott, an "impressionist" study of a rustic, too large in scale for the subject, but with much character; "The Caretaker" (172), by Mr. Couldery; "Songs without Words" (268), by Mr. A. S. Cope; "Old Cronies" (294), by Mr. Seymour Lucas; "The Jolly Miller" (391), by Mr. H. S. Marks; "A Relic of the Past" (436), by Mr. Hugh Carter; "A Moonlight Night, Venice" (477), by Mr. Arthur Severn, a very fine work; "A Difficulty" (528), by Mr. Arthur Hacker; "A Hunting We'll Go" (541), by Mr. Dendy Sadler, clever, but a vulgar rendering of a spirited old English ballad; "Two Thousand Feet above the Sea" (556), by Mr. Joseph Knight, a fine landscape, but too precisely like a great many others from the same hand; "Horatio Sparkins" (647), by Mr. F. Barnard, who has hit off the spirit of Dickens to a nicety; "Evening Shadows" (661), by Mr. C. E. Johnson; "Jealousy" (733), by Mr. Tom Lloyd; "Waterlilies" (747), by Mr. Aumonier; and "A Special Pleader" (782), by Mr. W. S. Stacey. We should like to know on what principle the illustrations appended to the catalogue are selected. A good many of the best works are omitted among them, and some very poor ones included.

THE agitation of a few months back, having for its object the amalgamation of the southern railways, seems to have borne fruit. Amongst the seventy or eighty Railway Bills awaiting the attention of the ensuing Parliament is an application for an Act to unite the London, Chatham, and Dover and the Brighton and South Coast lines, and thus a scheme which, at one time, appeared not unlikely to collapse will be partially carried out. Perhaps Sir Edward Watkin is as independent in railway as in national politics, for the South-Eastern is not committed to the amalgamation scheme, though powers will be applied for leaving it open for the united lines to co-operate with the South-Eastern and enter into working agreements in their joint interest. It has been notorious that a large proportion of the receipts [of these lines has been swallowed up in legal and other expenses, due to competition, and the proposal should result in a substantial addition to the amount at the disposal of the directors. It is getting generally recognised that competition has many evils as well as advantages, and that in the case of railways, the former often preponderate. The *Times*,—while fearing that the absence of the South-Eastern from the compact may cause rivalry to continue,—hails the announcement with much satisfaction, as an earnest of more attention being paid to the accommodation and safety of passengers. We repeat the hope we expressed when the subject was first mooted, that the shareholders will be content with a portion of the amount this arrangement seems likely to save to them, and that their customers will thus be allowed to share in the benefit.

WE learn with great interest from the last issue of the *Philologische Wochenschrift* that Dr. Dörpfeld, in the course of his excavations in the Acropolis, has had the good fortune to light on the remains of a prehistoric palace, which, so far as is at present made out, seems analogous to the one found at Tiryns by Dr. Schliemann, and fully described in his new work, of which a review recently appeared in the *Builder*. Dr. Dörpfeld's discovery comes therefore at a time when it will arouse the keenest interest. The remains lie in the space between the Erechtheum and the Parthenon. Full particulars will appear in the *Mittheilungen* of the German Institute at Athens. From the same paper we learn that Dr. Lampsakis, founder of the Society for the Preservation of Christian Antiquities in Athens, and director of archæological matters for the district of Eretria and Chalkis, has made an important discovery of a large number of inscriptions and a life-size marble statue. Of what date these monuments are no report is as yet given.

AN exhibition has been collected at Messrs. Howell & James's of hand-woven stuffs and hand-sewn embroidery, representing Irish work and Irish patterns; the latter borrow more or less from the "Book of Kells" (of course the simpler designs only; the more elaborate ones from that source could hardly be produced in flax embroidery). The object is, we presume, to stimulate a demand for Irish work of this class, as has before been done in regard to Irish lace. The success of such an effort depends, of course, on whether there is any quality or special excellence in the work which cannot be attained elsewhere. The Irish lace, as we before said, has a style peculiar to itself, and so has this Irish flaxwork, and some of it is remarkably cheap in comparison with the artistic effect produced, and the thorough workmanship exhibited. Whether these qualities will create any demand for it, of course, we cannot say. We fear it is mainly a matter of fashion.

IN consequence of the decease of M. Perrin, the Académie des Beaux Arts must to-day, the 5th of December, nominate a new honorary member. A committee, composed of MM. Gerôme, painter; Guillaume, sculptor; Garnier, architect; Chaplain, medallist; Ambrose Thomas, musician and composer; and the Duc d'Aumale, honorary member, was formed to draw up a list of candidates. This list was presented at the Academy on the 28th of last month, and on the first line bears the name of Baron Alphonse de Rothschild, who was chosen unanimously.

IN regard to the removal of the Norman turret at St. Alban's, of which we spoke last week, Sir E. Beckett has endeavoured to insinuate, through his usual medium, the *Times*, that it was not genuine Norman work; at least, that is the meaning which his words are apparently intended to convey to the general reader, though he steers clear of actually committing himself to the statement, which would be simply "saying the thing which is not." As to his remarks about the motives of our criticism, we, of course, take no notice of them, except to observe that we had imagined Sir E. Beckett was an old enough lawyer to know that it is not very wise to make statements which you cannot prove; and that to impute motives is the usual resource of a weak case.

LETTER FROM PARIS.

THE month of November has closed, at Paris, with a beneficent action. The business was to assist the Orphan Girls' Institution, in which Madame MacMahon is interested, and the greatest names in France, as well as the best-known artists, hastened to respond to the appeal of the Duchesse de Magenta. Accordingly, by the side of the works contributed by Hebert, Bouguereau, Baudry, Laurens, Chapu, Madame Lemaire, Lewis Brown, and Carolus Duran we have seen promenaded and dispersed at a sale by auction the charming canvases signed by the Princesse Mathilde, the Baronne N. de Rothschild, and the Marquise d'Hervey St. Denis, and the sculptures modelled by the Duchesse d'Uzès, the Comtesse de Beaumont, and Sarah Bernhardt; a curious assemblage of illustrious names and diverse talents united in the same ennobling aim of charity.

This fashionable sale, which had a great *succès de curiosité*, commences the series of private exhibitions. On Monday there opened at the "Galerie Petit" one consisting of the works of an artist who was strongly attracted by the drama of misery, which he interpreted with poignant realism. We refer to Tassaert, now nearly forgotten, and who suffocated himself out of existence about twelve years ago, like some of the unhappy ones whose sorrows he loved to depict. Then will follow, in the same gallery, the annual water-colour exhibition, at the same time that, at the Palais d'Industrie, there will commence that of the lady artists' inauguration about five years ago.

During the month there will also be settled two competitions, one for a statue to Rousseau, the second to give the Boulevard St. Germain a statue of Broca, the celebrated anthropologist. For the Rousseau statue, the competition is limited to three sculptors, MM. Berthes, Larche, and Steiner, whose sketches were judged the best in the general competition in August last. The decision as to the Broca competition will be given about the middle of this month.

In the matter of competitions we should mention the success gained by a young architect, M. Ancion, pupil of M. Pascal, who has obtained the prize in the Chaudesaigues competition. The subject given this year was a project for a monument to a great man, to be placed in his native town. The gainer of the prize, which is adjudged by the architectural section of the Institute, will receive for two years an income of 2,000 francs, which will enable him to finish his studies in Italy.

There is to be opened in the Louvre a photographic museum, under the control of the State. This may have the advantage of popularising, by photography, and bringing more before the public notice, the *chefs d'œuvre* of our national museum, though the idea of issuing photographs officially stamped by the State may seem questionable in some respects.

A recent addition to the Louvre is an important collection of Greek figures, found a few years ago at Myrina in Asia Minor, by two pupils of the École d'Athènes, MM. Bottier and Salomon Reinach. These figures will be exhibited on the first floor in a room in the Antiquities department.

After a long time with little of sculpturesque event, we have at last some important works in sculpture to record. In the first place, there is the monument to Delacroix, of which M. Dalou has just finished the model, which has been unanimously accepted by the subscription committee. M. Dalou was the very artist wanted to interpret the physiognomy, so full of originality, of Eugène Delacroix. His sketches show, harmoniously combined, the figures of Justice, Time, and the Genius of the Arts, grouped around a pyramid, which is surmounted by the bust of the great painter. This monument is to be put up in the garden of the Luxembourg, not far from the old Orangery, now transformed (as we have mentioned) into a museum, and the pediment of which M. Crank is decorating with a large bas-relief representing France offering palms to Painting and Sculpture.

In this time of "statue-mania," when the effigies of so many mediocre or contestable talents encumber our streets and public places, it is pleasant to see homage rendered, late in the day as it may be, to genuine national celebrities. After Delacroix, Balzac will at last have also his statue. Let us hope that the subscription opened for that purpose will enable us soon to repair an unpardonable neglect towards one of the greatest literary reputations of our times.

We may mention also, as works in course of execution, the statue of Joan of Arc which M. Pezieux is executing for Rouen; the monument to Eustache de St. Pierre, of which M. Rodin is completing the design, and which will be erected at Calais; and, lastly, the monument to Admiral Courbet, of which we have seen a sketch by M. Falguière. We do not hesitate to say that in this work the inspiration of the artist is much better exhibited than in the group designed for the Arc d'Étoile, and which has been justly criticised. The general effect of the monument to be erected at Abbeville to the greatest of her children is very fine in a decorative point of view. In another part of Paris it is proposed shortly to place, at the extremity of the Ile des Cygnes, the reduced copy of Bartholde's statue of Liberty lighting the world. This statue, which, though a reduced copy, is not less than 7 metrès in height, will send rays of electric light over Paris, like a lighthouse standing in the midst of the river.

At the Hôtel de Ville, where great preparations are being made for the intended fêtes, the decorators are at work in the *salons de réception*, while the Municipal Council are endeavouring to make up their minds in regard to artistic painting, properly so-called. These delays are deplorable, and very prejudicial to French artists; what, then, will it be if, under pretext of economy, the budget of Beaux Arts for the city is reduced in 1886 by a hundred thousand francs?

On the other hand, the administration proposes to decorate a Mairie in Paris, which has not much need of it, and two Mairies in the suburban district. At Paris, M. Besnard, whose very original talent has been especially signalised in the last two *salons*, will be commissioned to paint three large panels in the Mairie of the *premier arrondissement* (Place du Louvre). It is an excellent choice, although M. Besnard presumes a little sometimes on his facility of execution. Wishing to be a progressive artist, he yet cannot quite abandon his classic studies. Accordingly the Impressionists accuse him of being a mere executant, and the Institut reproaches him with realistic tendencies.

Extra muros, M. Chartran is to decorate the "Salle de Mariages" in the Mairie of Saint-Denis, while M. Delahaye will undertake that of Montrouge. These works, relatively important, are in some sort "consolation stakes" granted to artists of merit who have not been successful in the recent municipal art-competitions. This indicates also a tendency on the part of our Ædiles to depart a little from that hitherto invariable practice of public competition, which has not had all the good results expected from it.

As to the Hôtel de Ville, in default of modern painters the Administration are betaking themselves to ancient ones, and M. Haro, the well-known expert, is commissioned to restore eight very fine paintings by Hubert Robert, brought from the old Hôtel Beaumarchais, and which, placed in the Hôtel de Ville in 1816, escaped by some extraordinary chance the incendiaries of 1871. These paintings, representing landscapes adorned by statues and classic ruins in the taste of a former period, will form a piquant contrast with the modern landscapes which are to adorn the vestibules and the *escalier d'honneur*.

In our last we spoke of the architectural and archæological interest attaching to the old tower of the Ducs de Bourgogne. We may now add that the Administration have asked for 200,000 francs from the Municipal Council to restore this tower, under the direction, as before stated, of an experienced architect, M. Huillard.

We expect that the same administrative solicitude will shortly be extended to the marvellous chapel of St. Julien le Pauvre, which it will be easy to save, at a little cost, from imminent ruin, if, as the "Société des Amis des Monuments Parisiens" * request, it is made into a lapidary museum, an annex of the Carnavalet Museum.

Space is wanting to enumerate all the works of architecture actually in course of execution. The State is about to restore the flèche of Notre Dame, constructed in 1863 by Viollet-le-Duc. In regard to the "Gare St. Lazare," of which we have already spoken several times, the new constructions begin already to make a considerable show, especially at the angle of the Rue de Rome and the Rue St. Lazare, where a building with a façade of 120 mètres has already passed its first story. Here the work will be finished in three months. On the side of the Rue Amsterdam, the necessary expropriations have caused some delay; but higher up, near the Rue de Berne and Rue de Vienna, the building of the annexes proceeds rapidly, and on twenty-four great stone pillars erected on the railway level, the workmen are getting into position the gigantic iron girders necessary for the enlargement of the Place de l'Europe. Here there is a building yard in full activity, but we want a good many more going like it to restore to Paris her normal industrial condition. On the other hand, the works at the National Library, in the portions bordering on the Rue de Richelieu, are nearly completed, and in a little while the public will be admitted into the new galleries opening on the Cour d'Honneur, the last vestige of the Hôtel de Nevers, built by Mansard, which it has been decided shall retain its ancient physiognomy.

Among the important works executed by the municipal authorities, we may also call attention to the construction, at the principal hospitals, La Pitié, St. Antoine, Beaujon, Laënnec, and Necker, of special pavilions for important surgical operations. The question has also been raised of re-constructing, on a vast scale, the Church of Ste. Marie des Batignolles, which has become notoriously insufficient for a quarter which is growing daily richer and more populous; but we only speak of this now to point out that, with the well-defined ideas of the Municipal Council upon the question of the separation of Church and State, their financial co-operation could not be counted upon. If, however, the new edifice is ere long made the subject of a public competition, the promoters will probably be able to collect among its rich congregation the considerable capital required for the operation.

On the 19th of December it is proposed to inaugurate, by a grand ball, at the Chamber of Commerce, the series of charitable *fêtes* organised by the commercial and industrial classes, for the benefit of the poor of Paris.

The edifice erected in 1869 by M. Bailly, the sympathetic president of the Société des Artistes Français, lends itself marvellously well to a *fête* of this kind, thanks to its luxurious rooms, and its monumental, original, and richly-decorated staircase,—thanks, above all, to its immense glazed court, recalling the ancient atrium, which will be transformed into the ball-room.

This first *fête* will be followed by another grand ball at the Bourse. The occasion should be seized to restore the paintings in grisaille of Abel de Pujol.* Then there will be, in succession, a monster *fête* at the Hôtel de Ville, a historical concert at the Trocadéro, and a performance at the Opera, in the course of which the national drama will be represented in its successive transformations. It is also proposed to show an architectural restoration of the Pont Neuf as it was in the time of Louis XIII., with its stalls, its picturesque structures, and Tabarin's open-air theatre. The whole will be concluded with a historical procession. The programme is more full than really attractive; these Mediæval shows will always have, whatever one may do, an appearance of masquerading which will hardly escape the sarcastic wit of the Parisians. A procession, however historical it may be, will be, to sightseers, but a reminiscence of the procession of the "*bœuf gras*," the disappearance of which they have regretted for fifteen years past. The only thing which will be of interest and really worthy to attract refined amateurs of artistic tastes will be the performance in which will appear in succession the antique drama with its choruses, the Mediæval drama, and its mysteries, and that of the seventeenth century with its ballets and its *romans* in powdered wigs and pigtails.

That which concerns us most from our special point of view is the important restoration of the Pont Neuf as we see it in the old engravings of Abraham Bosse and Ciastre. The presence on the committee for the fêtes of M. Hoffbauer, the eminent architect and learned *collaborateur* in "Paris à travers les âges," permits us to express a confident hope that the reproduction will be carried out with the fidelity indispensable to the success of the project.

If ever a director of a museum has had reason to be surprised, and very agreeably surprised too, it is beyond contradiction M. Darcel, the new director of the Cluny Museum, when the other morning he opened a mysterious and carefully-sealed roll, which an unknown hand had left with the concierge of the Museum. Under the thick envelope of grey paper was found a collection of extremely curious manuscripts enriched with precious miniatures of the fourteenth and fifteenth centuries. The joy of M. Darcel, at first somewhat mixed with scruples, is now complete, for the Procureur of the Republic has declared the donation valid. The manuscripts so singularly presented will, therefore, shortly be exhibited to the public, to whom such a stroke of good fortune comes but seldom.

We will not close this letter without mentioning the very interesting exhibition at the Hôtel de Ville, arranged under the care of the Direction Générale de l'Assistance Publique. From a strictly artistic point of view, one might certainly criticise the objects and furniture exhibited, but when one recollects that these objects and this furniture are the work of young children collected from the gutters, and deeply imbued with the corruption of a great city, one is led to hope for the future, and to believe that, thanks to the technical schools of the Administration Municipale, a school of educated and honest workmen may be formed, capable of preserving the traditional renown of French art industries.

* This is the counterpart in Paris of our "Society for the Protection of Ancient Buildings," but we trust it is a more reasonable body in its action and principles.—Ed.

* Paintings on the roof, in imitation of bas-reliefs.

TESTS OF SEWAGE EFFLUENTS.

The advocates of many of the chemical processes now employed, in various parts of the country, for the defecation of sewage are apt to speak, in more or less favourable terms, of the purity of the effluents which they produce. This purity, it should be remembered, in no case deserves the name on either chemical or miscroscopical grounds. No known existing process proposes the destruction of those germs which form the most dangerous concomitant of the sewage poison. As to the degree of chemical purity attained, the following abstract from the analyses given in the reports of the River Pollution Commissioners may enable the sanitary reformer to appreciate how far it has been carried out:—

Place.	Process.	Sewage. Grains of Solids per Gallon.	Effluent. Grains of Solids per Gallon.
Coventry ..	.....	58·80	45·22
London	A.B.C.	66·73	56·35
Leicester ..	,, ...	129·99	88·18
Leamington.	,, ...	163·51	73·38
Stroud	Sulphate of Alumian	64·05	40·30
Bolton	Marsden and Collins	—	62·65
Birmingham	Lime	117·60	57·40
Wimbledon.	Hille's	183·91	67·00
Leeds	Hanson's	—	45·92
,, ...	Goodall's	—	50·47
Tottenham ..	Campbell's	—	58·96
Leicester ...	Lime	90·73	71·89
Blackburn...	,, ...	70·96	55·52
Hertford ..	Lime and Chloride of Lime	26·42	28·76
Northamptn	Irrigation	119·78	62·62
Barking	,, ...	78·75	55·47
Banbury ...	,, ...	86·81	56·88
Rugby	,, ...	45·52	48·60
Bedford	,, ...	70·14	53·76
Norwood ...	,, ...	95·78	58·17
Croydon ...	,, ...	43·82	31·50
Warwick ...	,, ...	51·03	46·27
Worthing ...	,, ...	44·98	41·86
Edinburgh ..	,, ...	71·12	47·43

It will be seen from the above that the average result of the various processes of which the details have been tabulated has been to remove about 30 grains, out of a total impurity of 85 grains, per gallon, from the effluent water. Fifty-five grains of matter thus remain in solution, the strength of which, in one or two cases is even more than was originally contained in the sewage. Both in solution and in suspension, no attempt has been made with the direct aim of either destroying the putrescent matter, or killing the germs which it contains. The 30 grains removed is simply precipitated, and that apparently by the mechanical action of the precipitants added. It is not disinfected, but the putrescent matter which it contains is stored up. The precipitants used, in so far as they are not dissolved on the effluent, are added to the precipitate. They amount to from 24 to upwards of 300 grains per gallon, according to the process. To the resulting deposit is added from 50 to 87 per cent. of water, forming a sludge. Thus an average precipitate of 30 grains per gallon will be swelled to from 300 to 1,800 grains per gallon of sludge, the water entangled in which has to be removed, either by mechanical means or by the application of heat. Such are the results as yet put on record as to the degree of purity obtained by the effluent from chemical treatment, and as to the bulk and character of the accompanying precipitate. It is possible that better instances may exist, but the above is a perfectly fair abstract of all the cases cited in the valuable work by Messrs. Robinson & Mellis, on "The Purification of water-carried Sewage."

"Bad Drains and How to Test Them." The author of this book, noticed in an article last week on the "Literature of Sanitation," complains that we have misrepresented him in quoting him as saying that it did not require a large amount of scientific knowledge to ensure a healthy dwelling, but that sound pipes and tight joints are the desiderata. He points out that his sentence was, "What is required is sound pipes, the area of them in proportion to the work they have to do, tight joints, and a knowledge of ventilation." The last is an important addition certainly; but "a knowledge of ventilation" is such an exceedingly vague sentence that it can hardly be regarded as an item in the list of practical necessaries as given by the author.

Erratum.—In a letter on "Saxon Church at Deerhurst," p. 770, for "Alto-Roman" read "Celto-Roman."

THE DECORATIVE WORK OF THE EARLY GERMAN ENGRAVERS.

PART I.

THE PRECURSORS OF ALBERT DÜRER.

BEFORE we make use of their names in familiar converse with our readers, let us make a formal introduction of these artists, one particular branch of whose work we propose to discuss, and, if we may venture to say so, criticise.*

The time is the latter half of the fifteenth, and the first half of the sixteenth century,—roughly speaking, from 1466 to 1550. Their country is Germany, north and south, together with the neighbouring small kingdoms. For their vocation they are, for the most part, painters; others are goldsmiths, and some one or two architects. The art they practised, and for their excellence in which they are chiefly known, the then newly-discovered one, engraving on wood or metal; their object being to obtain numerous facsimiles of the designs they made for their work. The subjects they engraved, scenes from holy writ, pictures of their every-day home life, and ornamental decoration. Their names,—one of which, at least, will be familiar; of others, even to the learned, nothing but the shadow remains,—the Master E.S., otherwise known as the Master of 1436, Martin Schongauer, Israhel van Meckenen, the Master M.Z.; these are the forerunners. Then Albrecht Dürer. Then the disciples, followers, and imitators: the group of little masters,—Albrecht Altdorfer, Hans Sébald Beham, Barthélemy Béham, Jakob Bink, the Master I.B., George Pencz, and Heinrich Aldegréver; Lukas van Leyden, Virgilius Solis, and the Master W.

A magnificent collection of their works was bequeathed to the University of Cambridge by Earl Fitzwilliam in 1806; to this have been added the Kerrick Collection, a collection from the University Library, and many purchases, the whole forming a collection which ranks only after the national ones of England and Germany. It has been duly ordered with wonderful and loving care by Professor Sidney Colvin, Slade Professor in the University. From this collection, with the permission of the Vice-Chancellor, and with the courteous help of the present director, Dr. Waldstein, and his able assistant, Mr. C. E. Wilson, we have culled the many examples of the works of the masters which have been reproduced, without which it would be impossible to discuss the subject. From Professor Colvin's twelve admirable papers on "Albert Dürer: his Teachers, his Rivals, and his Scholars," which appeared in *The Portfolio* for 1877, we have borrowed such slight historical references as were necessary to connect harmoniously the threads of discussion.

We propose to consider these masters solely in their capacity as inventors of ornamental designs; to note, so far as we are able, their work in, and influence on, decorative art. This special branch of their work has not, we believe, been treated separately, but only incidentally, as in the learned papers just referred to.

The object of decoration is to break up uniform monotonous surfaces so as to obtain light and shade. This is effected by the arrangement of lines of varying breadth, more or less according to a pattern. At the same time, all objects present to the eye an arrangement, in some form or other, of lines,—the lines of configuration which are defined against the background, the lines of broken surfaces within itself, and the lines formed by the shadows falling on it, either from its own projections or from extraneous objects. The representative arts, drawing and painting, busy themselves with the reproduction of the appearance of objects, and this can only be done by placing lines on the surface of the paper or canvas, arranged in the position of, and to represent the lines of contour and shadow which the object presents to the eye. The decorative arts, on the other hand, are concerned only with the pleasing and harmonious arrangement of lines used, not to represent other lines, but for their own sake, and for the effect they produce of themselves. Each, therefore, has its own well-defined limit: representative art to copy as faithfully as possible; decorative art to arrange lines without any attempt at copying. Directly decorative art begins to copy it ceases to be decorative, and becomes, according to the slightness of its copying, bad representative art.

In the arrangement of these lines, suggestions as to form are, and should be frequently taken from nature. Man could not hope to produce out of his inner consciousness such wondrous arrangements of lines as nature sets before him; therefore, we find designs innumerable based on the form of the petal, and on the construction of natural flowers; witness the honeysuckle pattern; the fleur-de-lys; the ivy pattern, so much used by the Mediæval illuminators; the acanthus; and a whole host of others. The leaf or flower is not copied, but its leading characteristics are adopted, and a design is made on that basis, adapted to the materials in which it is to be worked. This process is called conventionalising; and when natural forms are made to assist the decorator, if this process is ignored pure decoration becomes impossible. So far, then, as to the parts of the design. But nature helps us still further with suggestions as to its structure or arrangement on the surface. Natural growth is tangential, and nothing can be more beautiful,—that is, less jarring to the eye,—than lines running smoothly, without angular breaks, one from another; so we can discover no law of beauty for the arrangement of the waving lines of a design, better than one based on the principle which nature herself adopts. One principle more: the object of decoration is to break up a monotonous uniform surface. The evil to be cured should not re-appear in the cure. Very marked features themselves become monotonous when repeated, and to bear repetition is one of the tests of a good design; more especially monotonous is it if the repetition is of a prominent uncovered space. The best designs are those which cover the surface equally; that is, in which the light and shade are evenly balanced in all parts of the surface.

The transition from flat work to work in relief does not present any difficulties in the application of these principles. The line of demarcation between the representative art of the sculptor and the decorative art of the stone-

Fig. 3.

* The initial letter, which we will call fig. 1, is from Van Meckenen's Alphabet, and the head-piece, fig. 2, is by Barthelemy Beham.

mason or metal worker, is as easily defined as before, the principles of decorative modelling being almost indentical with the principles of decorative design. Example is better than precept, and the examples of the acanthus on Corinthian capitals and the Tudor rose are everywhere ready to hand. It must not, however, be forgotten that in drawing patterns for relief decorations, representative art has to be called in; the shadows caused by the modelling have to be indicated by the same means as the shadows caused by the dimpling of the petals; and it is sometimes difficult in such cases to arrive at the real intention of the designer. As a considerable portion of the work of these German masters was designed for execution in metal, this fact must not be lost sight of.

The first sign of any attention being given by the early engravers to decorative art is the grotesque alphabet devised (rather than designed) by the Master E.S., about the year 1466 (Bartsch, 106). The letters are curious compositions, and many of them are hard to decipher; they are about 4 in. in height, and are constructed out of the contortions of two or more animals. It is curious to note what a fascination the designing of these grotesque alphabets seems to possess even in the present day. If we remember right, Ernest Griset has produced similar initial letters without end. The notion evidently sprang from the quaint figures which the missal painters of the fourteenth and early part of the fifteenth centuries delighted in; but whereas in the missals the animals with their interlaced tails had nothing but the barest resemblance in outline to the beasts that perish, and were invariably coloured, like the rest of the ornamentation, quite flat, or with conventional shading only, the Master E.S. has worked his own sweet will, and assisted his menagerie into positions which often their anatomical construction would scarcely allow. A triumph of the infant art they undoubtedly are, but as decorative designs they have little or no value. The whole series has been reproduced by J. B. Obernetter, of Munich. The Cambridge collection possesses only one original example of the series, the letter Z, and this, curiously enough, has the mark of Martin Schongauer added.

The same remarks apply to an engraving by an anonymous master of the same period, which is undescribed by Bartsch and Passevant, but which is generally known as the "deuce" of a pack of cards, the suit, however, not being indicated.

Among the works of Martin Schongauer there are only two noteworthy decorative designs; they are, however, so important in the history of the art, that we have reproduced both of them. Schongauer, although three of his brothers were goldsmiths, does not seem to have taken to that handicraft, but to have devoted himself exclusively to painting and engraving. It is curious that he did not make more designs for his brothers, because in the few specimens of pure decoration which have come down to us, he seems to have grasped without difficulty the fundamental principles of the art. So pronounced, indeed, was his recognition of these principles, that they were at once adopted and developed by his imitator, Israhel van Meckenen, of whom we shall next have to speak.

In the *rinceau d'ornements* (B. 108), the tangential flow of the lines, though occasionally somewhat crude, is very pronounced. The conventionalised foliage is exceedingly good, but the beauty of the design (fig. 3) is much marred by the introduction of the real live owl with a bird in its mouth.

The spray (B. 110) is, with the exception of the trunk from which it springs, a perfectly conventionalised form (fig. 4), there being no attempt at producing an imitation of the leaf from which the idea is taken. It is called by the authorities "a Gothic scroll," which conveys the idea that it is a copy of some fragment of architectural carving. It appears, however, to be an original study, suggested by a deeply serrated leaf, the conventionalising being carried out in the finest Gothic spirit. The manner in which the natural structure of the leaf is preserved is remarkable.

But the most famous designer of this period is Israhel van Meckenen, and there can be no doubt that of the many designs of Schongauer which he studied and copied, none can have had a more important influence upon him than the two we have reproduced. From the first he must have learned the true principle of construction; from the second (his copy, which is extant, is reproduced below, B. 199), the principle of conventional form; and no artist before or after him has ever practised both so faithfully.

We come now to Van Meckenen's own work. Poor Israhel! he has been much belaboured by the critics. Next to Schongauer, he is the best known among those who shone before they

Fig. 4.

were eclipsed by Dürer. Specimens of his work are very rare, costly, and much prized; but Bartsch says, "His prints generally bear the Gothic stamp of his age, but exhibit not one of its beauties. His composition is ignoble, and without talent, and his drawing is extremely bad." Dr. Thausing gives him no more than a kick when he declares that "the very rudely-drawn sheets of Israhel indicate the highest point of what a goldsmith could do in engraving"; and the latest of his critics, Professor Colvin, will not gainsay, but only mitigate the censures of his predecessors: "In truth, Israhel is no artist of genius, but there is more in him than these phrases allow."

These criticisms cover the whole of his work. We profess neither to pronounce an opinion on the composition of his Bible scenes, nor to condemn his saints and martyrs. We will admit that in technical resource he may be far behind the greater master of 1466; but these sweeping condemnations should be confined to these two matters, and withdrawn from the master's decorative work. We protest, too, against debasing this decorative work as insignificant, passing it by as of hardly any importance, and as worthy a place in the collectors' cases merely from the fact that impressions are still extant, and that a collection would be incomplete without them. But, indeed, before he gets to the end of the paper devoted to this master, Professor Colvin has more than half relented, for he declares that "these pieces of mere ornament exhibit the strong and not the weak side of the early engravers." Of Israhel's technical skill we will only say this, that his firmness of drawing has never been surpassed; and that in the handling of the burin, in a style of work wherein the eye would detect, more than in any other, the slightest vacillation from steady and determined purpose, there is no sign of wavering.

Having studied Schongauer's works, as we know he did, we cannot be surprised, however, to find the same great fault, the introduction of natural animals, in Van Meckenen's early work, although later he shook himself completely free. One of these early designs (B. 196) is exceedingly weak; it is a confused mass of scroll-work and of all sorts and conditions of birds, the whole having neither rhyme nor reason. The design (B. 198) was, apparently, executed soon afterwards, and exhibits marked improvement. There is more ambitious work in the conventional foliage, although it is still far from perfect in form, and there is introduced a regular aviary of somewhat feebly-drawn birds. Bartsch thus describes it:—"Un rinceau d'ornemens. Il est garni de six différents oiseaux, parmi lesquels on remarque particulièrement un perroquet perché à la droite de l'estampe, vu de profil et tourné vers la gauche." The claws of Schongauer's owl were, indeed, still deep in Israhel's flesh.

But we must pass on rapidly to the copy of Schongauer's greater work,—the Gothic scroll. On Van Meckenen's plate there are two sprays or scrolls (figs. 5 and 5*a*), the first a very inferior copy, the second a variation of it, somewhat better drawn than its companion. Were it not that studies are always interesting, it is almost to be regretted that impressions of this plate have survived. Van Meckenen has the reputation of being, to a very great extent, a copyist of Martin Schongauer; that is, something more than a mere student of the master; one who, having studied, copied his master's designs and attached his own

Fig. 5.

Fig. 5*a*.

signature to them for circulation. It is said that there are upwards of fifty so copied; but, with regard to this one plate, it is improbable that either master intended it to be circulated. However this may be it is of the greatest interest and importance, both as it comes to us from the hand of the original designer and from the hand of the imitator. On its importance as a study of Schongauer's we have already touched. Its importance as a study of Van Meckenen's can be immediately judged by its influence on his subsequent work. A very slight study of the works which come before and those which follow this plate discovers at once its history. Evidently dissatisfied with the earlier works he had designed, such as the two already noticed, the master sought at the fountain of his inspiration a means of improvement. He found it in the "Gothic scroll," studied it diligently,

copied it roughly at first, then essayed his own hand in the same style; and, after this study, produced a series of designs based upon it, which, as we look at them one after another in their usual order of arrangement, still increase in beauty, until they reach a consummation of perfection which succeeding generations have struggled vainly to attain.

We do not know on what system Bartsch has arranged these designs, nor even if he intends his list to be chronological; very few of them are dated, but the internal evidence furnished by the designs themselves fully justified an arrangement which must have been the result of careful study, such as was, perhaps, hardly to be expected from one who thought so little of them. One of the first results of Van Meckenen's study of Schongauer is a series of very curious panels; the one numbered B. 201 alone is in the Cambridge Collections (fig. 6—see separate plate); it measures 10¼ in. by 5 in.; an acanthus scroll winds in equi-circular volutions all over it; the leaf ornament is exceedingly beautiful, the conventional treatment never being lost sight of for a moment; the tangential flow of the main trunk has not the perfection at which he afterwards arrived, although it is by no means bad; in each of the circles are grotesque figures dancing and playing, the central one being a woman in the conical head-dress of the time. In this plate there is, as it were, a foretaste of the spirit of Renaissance ornament which seized on all artists not many years after Israhel's death. The figures are introduced as the main feature of the designs, they stand on the acanthus scroll; the acanthus scroll. The tangent forms of the chief stem are very smooth and fine, there is only one blemish to be detected in their harmonious flow; it is only a slight one, and was perhaps not to be avoided on account of the necessity of providing a seat for David the harper. The foliage is very fine, and the surface well and evenly covered. One very noticeable feature is that there are very few flowers; the perfect mastery over the difficult art of conventionalising floral form was not arrived at till the celebrated alphabet was cut.

But the most important panel designed by this master is the one in which he has woven, in cabalistic fashion, his own name, "Israhel M" (fig. 8—see separate plate). The size of the plate is 10½ in. by 7 in., and it is a very triumph of designing skill. There is a framework, a mass of most elegant foliage winding hither and thither, and two intertwining bands bearing the legends, "*Non ultra Jacob nomen tuum erit, sed Israhel vocaberis*"; and "*Da Gloriam Deo.*" But by the time the legends have been read, the eye has also detected a majestic I traced from the top to the bottom of the frame, and then gradually, one by one, all the letters of the name Israhel; and on the right, but sideways, the single letter M. The magic of the design is at once grasped. The reverential feeling which suggested it seems also to have inspired its author with enthusiasm; the traditions of design are all left far behind; he depends no longer for beauty on the mingled strength and grace of a chief stem winding through and giving rise to the foliage, but the letters are independent each of the other; they are hardly with a design lending itself perfectly to its configuration, but there is no confusion, and, with all this mass of decoration, the letter itself stands out prominently and unmistakeably. Space will not allow of the reproduction of more than these two initial letters, but as we have dwelt much on the beauty of the flowers so noticeable in these designs, and on their perfect construction on the principles of conventional form, we have copied a few of

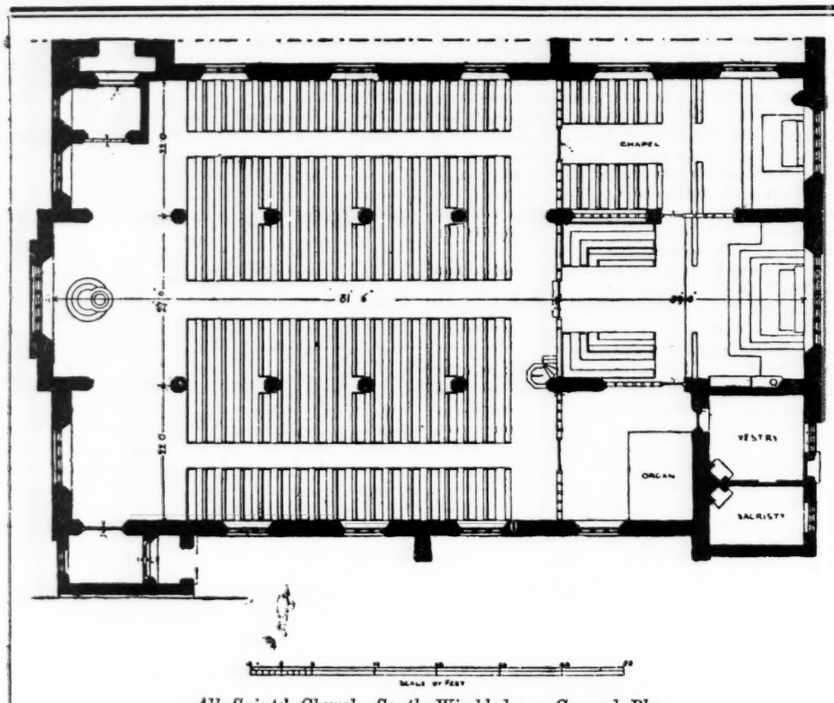
them, which we hope will appeal to the reader. It is impossible, however, to pass them by in silence. They are entirely creatures of the artist's brain, but the fidelity with which he has adhered to the natural construction of flowers is most remarkable. In the centre is either a fruit or a bundle of stamens; this is sur-

rounded by a number of petals: in some there is only one row; in others there are both petals of a corolla and sepals of a calyx; but, however

Fig. 7.

it is a ladder which they strive to climb; but it is subordinate to them, just as in Renaissance ornament, a centaur, an animal, a man, or a part of a man forms the central figure, from which wreaths of flowers and foliage spring. Of this Renaissance ornament we shall have to speak presently; it is sufficient to say here that the human form, although divine, does not lend itself very readily to conventional treatment, even if conventional treatment were attempted; the little figures in the panel, however, are, and are intended to be, perfectly real. The improvement in construction to which attention is to be directed, is that (subject to the main objection) a perfect and harmonious design is arrived at, instead of the natural form being introduced promiscuously with the conventional forms, in the manner in which the birds are introduced in the early panels we have already noticed. The Jesse panel (fig. 7) follows next in Bartsch's list (B. 204), and marks an epoch in the powers of decorative design of the great goldsmith. The figures are the usual representations of the most celebrated of the descendants of Jesse of the seed of David. Their function, however, differs from that of the little people just noticed: they form no part of the decorative design, but are a series of pictures framed by the design which is based on even interlaced, and yet they are more than half-concealed; it is an effort which must have been a gigantic failure or a splendid success, but from the moment the burin touched the copper the triumph must have been assured. The next panel (B. 207) is of the same class as (B. 201) already noticed, but of inferior merit. The next (B. 208), which we engrave, is exceedingly fine (fig. 9—see separate plate). It is a small picture, two seated figures, encircled in an elaborate framework, the whole forming a circle 6½ in. in diameter. The design of the frame is noticeable for the very great beauty of the flow of the main stem as well as for the charm of the foliage: there are also introduced a great number and variety of conventionalised flowers, which produce a very charming effect. But the zenith of Israhel van Meckenen's art was reached in the celebrated alphabet, of which the initial B of this article, and E of the second part, are very fine examples. There are six plates (B 210—215), each containing four letters (one plate, unfortunately, is wanting in the Cambridge collection); they are very pure Gothic, the form in outline, so as to allow the cavities of the bodies of the letters to be decorated equally with the spaces. Every letter is closely packed with flowers and foliage; there is in none of them the slightest awkwardness of form, every available space is covered numerous, the natural law of growth is followed, and there is not one of them that cannot be traced to its proper position on the stalk that bears the fancied flower.

Builders' Benevolent Institution.—The sixty-fourth election of pensioners took place (as briefly mentioned in our last) on Thursday, the 26th ult., at Willis's Rooms, on which occasion the President, Mr. Arthur C. Lucas, took the chair. He said there were three candidates on the list, two men and one woman. This was the fourth application of J. R. Bisley and the third of William Thurston. He was glad to announce that no poll would be required, as the committee had decided to elect the three candidates, and he now declared them duly elected. A vote of thanks, proposed by Mr. T. G. Smith and seconded by Mr. T. Stirling, was cordially carried. This the President duly acknowledged, expressing the great pleasure it had given him to be President of so useful an Institution, and adding that his interest in it would not cease with his year of office.——As will be seen by an advertisement on our front page, arrangements are being made for the annual ball in aid of the funds of this Institution. The secretary, Major Brutton, will be glad to receive the names of gentlemen willing to serve as stewards.



All Saints' Church, South Wimbledon.—Ground Plan.

Illustrations.

GOVERNMENT HOUSE, SANDAKAN.

THIS building comprises a residence and offices for the Governor of British North Borneo. The offices are on the ground-floor, with residence over. The walls and piers are of brickwork, faced with cement, and all the woodwork of "Bilian." The rooms are large and lofty, and entirely surrounded by a wide open verandah, the shelter to that on the ground-story being increased by a pent roof and open cellular screens at the top of the openings. The entire area of the ground-floor is filled up solid and paved.

38, LIME-STREET.

THIS building, now approaching completion, is a block of offices on the estate of the Carpenters' Company, and is one of the last remaining sites which were created by the improvement lately made in this neighbourhood by the Carpenters' and other of the City companies. The building, which has only a narrow frontage to Lime-street, has a Portland stone front, with polished Aberdeen granite piers on the ground-floor, and contains several convenient and well-lighted suites of offices, and two floors of cellars below the ground. It is being built by Messrs. Colls & Sons, of Camberwell, who have also erected several other blocks on the same estate; and the architect is Mr. Alfred Howard.

EXAMPLES OF MODERN WROUGHT IRONWORK.

IT is not every day that we see a wrought-iron grille executed in illustration of a poem, but the first of the two plates of wrought-iron work given this week, with the spider and butterfly worked into it, is suggested by a poem of Spenser's, "Muiopotmos," or, the Fate of the Butterfly. The work was executed, with two side panels, for Mr. Arthur Flower. Of the two other examples, the railings were for a house in Remington-court, designed by Mr. Stevenson, and the panel was designed to fill a fanlight in some offices in Glasgow, by the same architect; the design embodying the owner's arms.

All three examples were executed by Mr. A. Newman; the spider-and-butterfly panel, as we understand, was designed as well as executed in his workshop.

DECORATIVE WORK OF THE EARLY GERMAN ENGRAVERS.

THE three photo-prints of panels by Van Meckenen are referred to in the article under this title on p. 783, *ante*.

ALL SAINTS' CHURCH, SOUTH WIMBLEDON.

THIS church is intended to be built on a good corner site in Haydon's-lane, South Wimbledon. The design of the church has been ruled by the conditions under which it has to be built. The site is broad, and, in a neighbourhood the population of which is increasing quickly, it is necessary to make the most of it. But only part of the site is now available for building on, and the large church is not yet wanted, and its cost is more than those who have undertaken the work are able to spend now. It is intended to be built in three parts; and these are arranged so that the temporary work may be as little as possible, and that at each stage of the building it may appear as a seemly, and, so far as it goes, a complete church inside, and outside may always show permanent fronts towards the two roads.

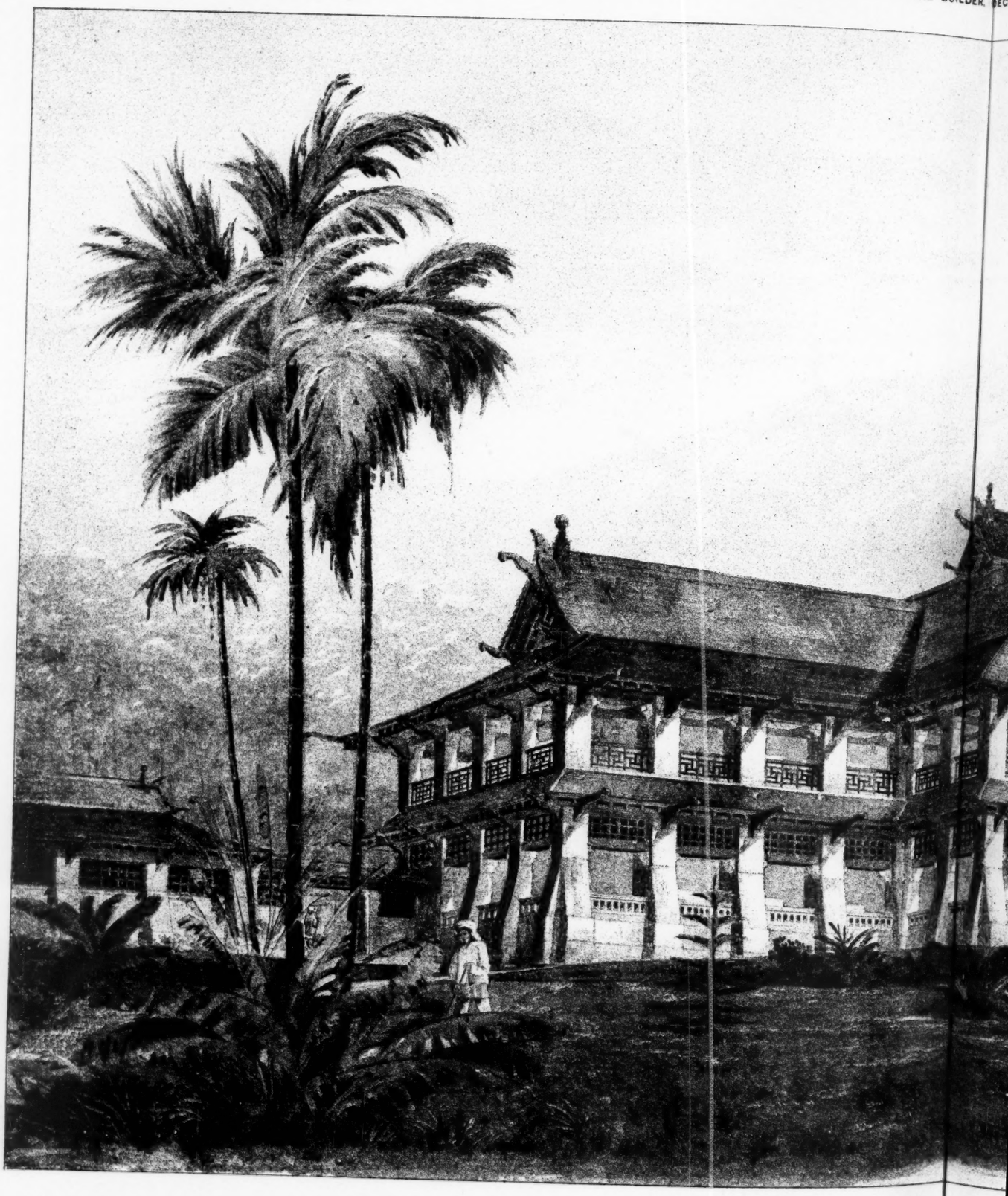
The church, when finished, will be 120 ft. 6 in. long inside, and 71 ft. wide, roofed over in three nearly equal spans; and the accommodation in pews and chairs will be 830. It is intended now to build only the north aisle, closing the arcade with a brick wall, except at the east end, where a small temporary aisle will be built to form a vestry and organ-chamber. The chapel will, for the time, serve as a chancel, and the sizes are so arranged that the choir-stalls intended for the chancel may first be set up and used in the chapel. This will make a convenient church for 250 people, and the cost of it is estimated at 3,500*l*. The architects are Mr. Somers Clarke and Mr. J. T. Micklethwaite.

NEW PUBLIC BUILDINGS IN BIRMINGHAM.

ON Friday in last week the Prince of Wales visited Birmingham, and opened the Jaffray Suburban Hospital, which has been erected at the sole cost of Mr. John Jaffray, and presented, together with eight acres of land, to the Governors of the Birmingham General Hospital, to be used as a branch hospital for the reception of patients suffering from chronic disease. The architect of the building was Mr. Yeoville Thomason.

On the following day his Royal Highness opened the new Art Galleries, which form, together with the Offices of the Gas Department, a continuation of the Council-house. In order to preserve the architectural harmony and design of the buildings, the Town Council entrusted the designs for the extensions to Mr. H. Yeoville Thomason, the architect of the original portion, and the building contract to Messrs. J. Barnsley & Sons. The result is a detached block of buildings fronting four streets. It is in the modern Italian Classical style. Originally the site of the new art galleries was intended for Assize Courts, but the subject was reconsidered, and it was decided that the depth of land was not sufficient for that purpose. Subsequently the idea of an art gallery on a large scale, which had been deferred as a project for the future, was brought prominently forward by the offer of Messrs. Tangye to give 10,000*l*. for furnishing a public Art Gallery with specimens, and the Gas Committee's requirements of accommodation for their great accession of business determined the Corporation to complete the Council-house by the erection of spacious offices for that department, above which should be built a series of art galleries where the art treasures of the borough might be shown and loan collections exhibited. The Gas Offices occupy nearly the whole of the space on the basement and ground-floor; the Art Galleries (with an entrance-hall only on the ground-floor), occupy the whole of the upper portion of the new buildings. By the arrangements adopted the whole of the space at disposal has been made use of. In the external design a clock-tower at the north-west angle, and a Corinthian portico, forming the entrance to the Art Gallery, are the most conspicuous features. The portico is lofty, and in the pediment is a group of sculpture representing Birmingham contributing to the Fine Arts, from the studio of Mr. F. J. Williamson, of Esher. The clock-tower contains an illuminated clock, with bells, by Messrs. Gillett & Co., of Croydon, which is the gift to the town of Mr. Follett Osler. From the portico in Congreve-street is a central doorway leading into an entrance hall, 40 ft. by 30 ft., around the walls of which is an ornamental dado of various kinds of marble, and above a series of arcades of semicircular arches of stone, springing from Devonshire marble piers. On one side the arches are open and carried by cylindrical marble columns, beyond which is the staircase, with marble balustrades, ascending to the floor on which the galleries are situated. The landing, which forms also a gallery, is treated in a similar manner, and is divided into three parts by arcades, having columns of Devonshire marble, with finely-carved capitals of Caen stone. Beyond the landing is a series of five galleries, approached one through the other by archways of marble and stone. The first of these is a fine room, of circular shape, 56 ft. in diameter, and 40 ft. high, arranged for pictures; the next is a smaller chamber, 52 ft. by 30 ft., which is devoted to Italian art; the third is the Industrial Museum, 97 ft. by 52 ft., divided longitudinally into three parts by arcades of ornamental ironwork, and having side galleries approached from the floor by circular iron staircases. This room will be devoted to art manufactures generally. The fourth gallery, which corresponds in general dimensions with the second one, will contain the Wedgwood collection, the gift of Mr. Tangye, and the last is the Picture Gallery, 83 ft. by 43 ft. and 40 ft. in height, which will be furnished with loan collections of pictures. The cost of the recently completed structure will amount to 100,000*l*., of which the cost of the Public Art Gallery was estimated at 41,000*l*. The external stone carving has been executed by Mr. J. Roddis, of Aston, and the internal by Messrs. Naylor, of Birmingham; the ornamental ironwork by Messrs. Hart, Son, Peard, and Co., and Messrs. Brawn & Co.; the marble-work by by Mr. Blackler, of Torquay; the tiled floors and ceiling by Messrs. Minton, Hollins, & Co.; the concrete arching by Messrs. Dennett & Ingle; and the glass-work by Messrs. Hawkes, of Birmingham. Mr. Cooper Whitwell has been assistant architect to Mr. Thomason. The whole of the Art Galleries and Gas Offices are warmed with hot-water by means of radiators, this work having been carried out by Mr. W. W. Phipson, of London.

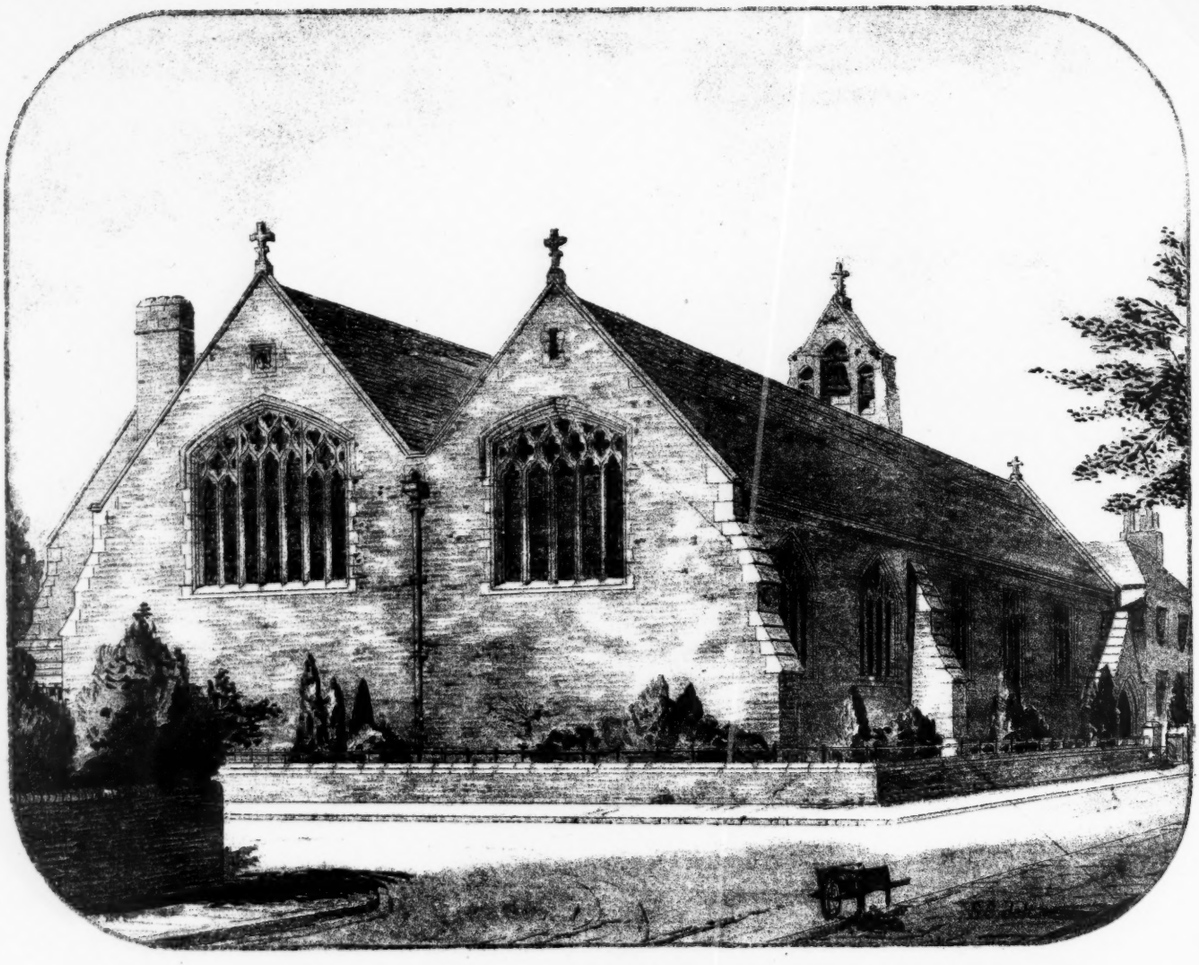
New Vestry-hall, Edgbaston, Birmingham.—In a limited competition for these new buildings, the designs of Messrs. Osborn & Reading, of Bennett's-hill, Birmingham, have been accepted. The buildings will comprise rate offices, board and committee rooms for select vestry, relief and vaccination department, a large assembly-room or vestry-hall, ante-rooms, caretaker's residence, &c. The buildings will be Renaissance in character, and the materials used red brick with dressings of dark red stone.

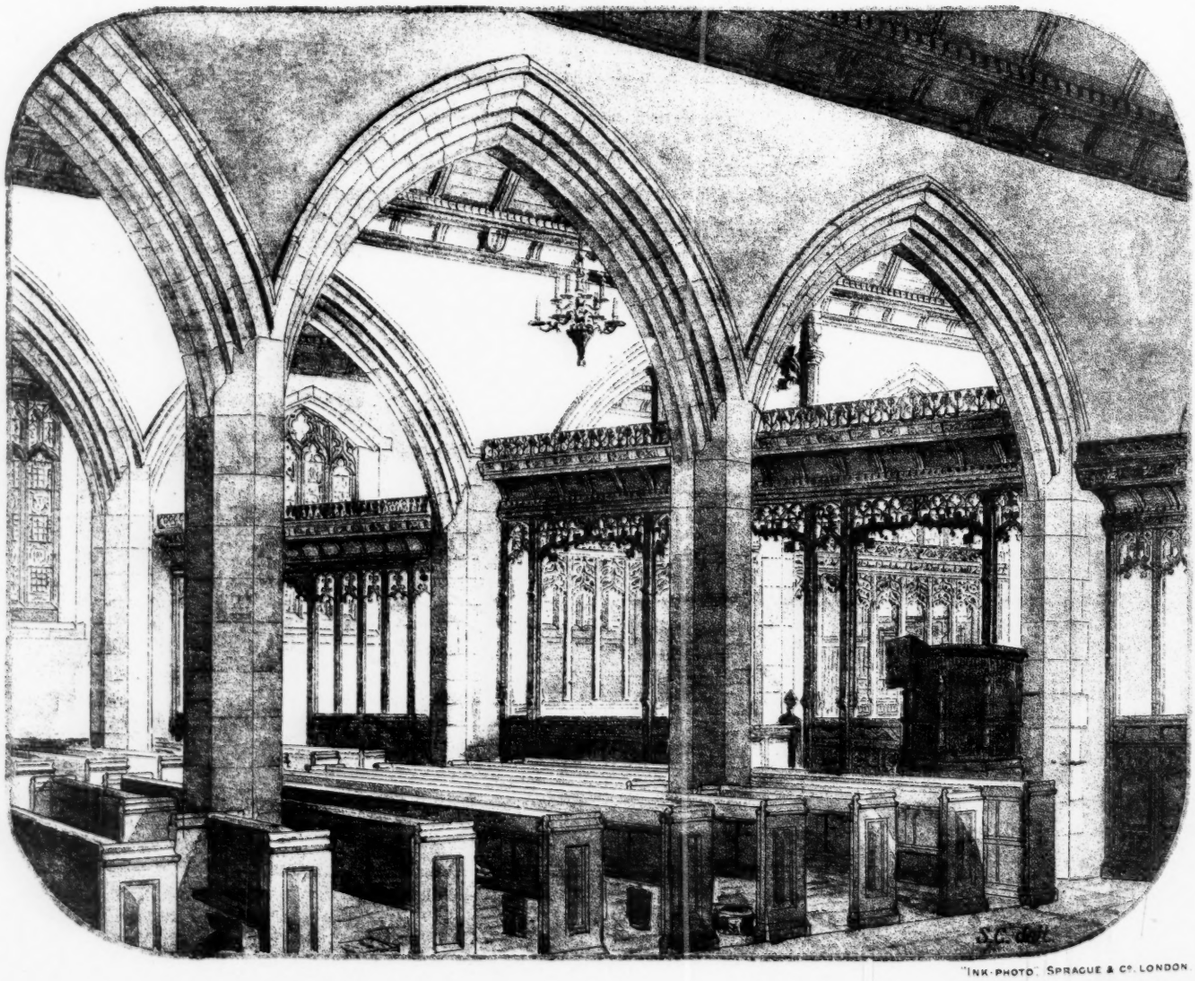


GOVERNMENT HOUSE, SANDAKAN, NORTH BORNEO

"INK-PHOTO," SPRAGUE & Cº. LONDON.

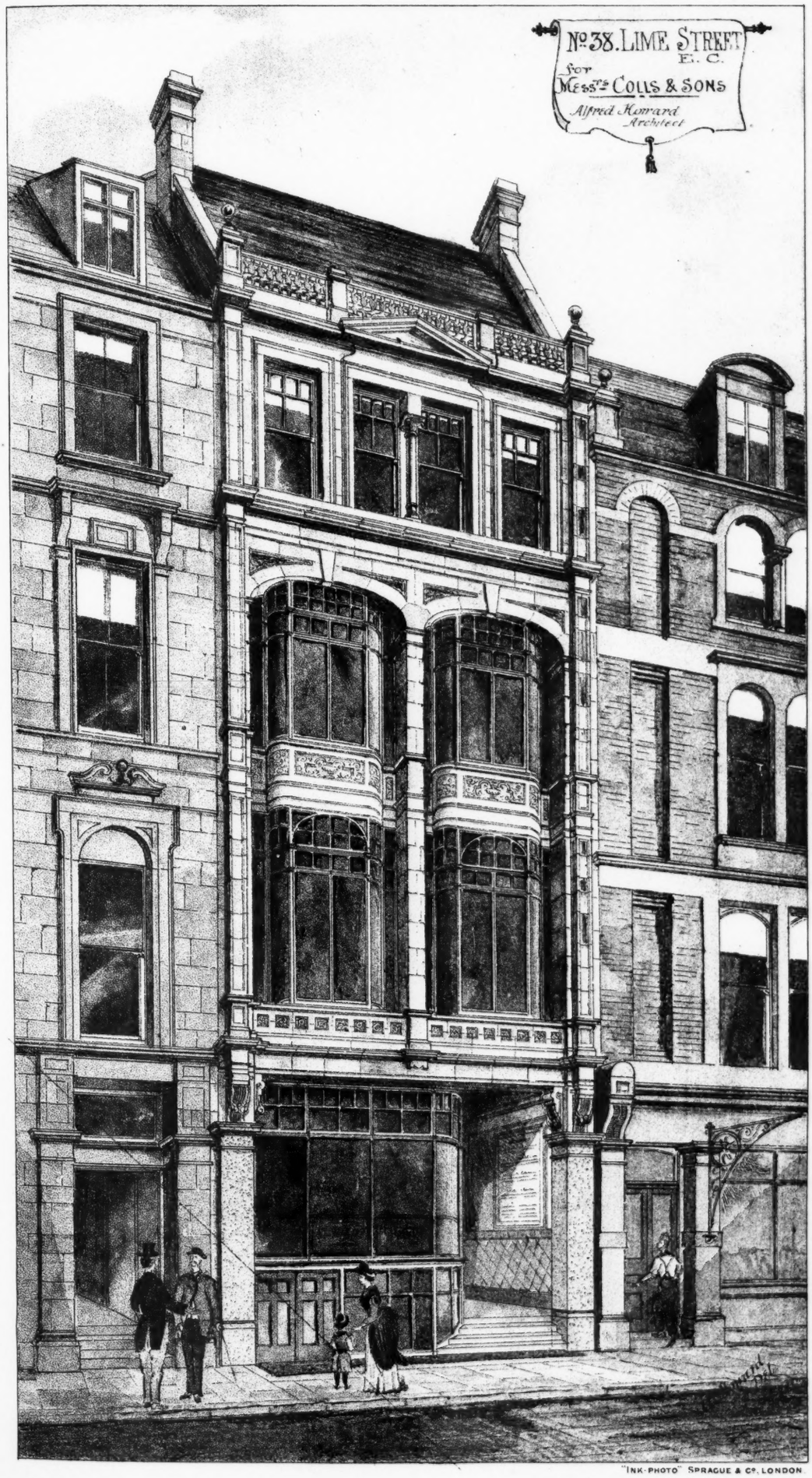
TH BORNEO.—Mr. Wm. Kidner, F.R.I.B.A., Architect.





"INK-PHOTO." SPRAGUE & Co. LONDON

PROPOSED CHURCH AT WIMBLEDON.—MESSRS. SOMERS CLARKE AND J. T. MICKLETHWAITE, ARCHITECTS.



OFFICES IN LIME STREET.—Mr. ALFRED HOWARD, ARCHITECT.

Fig. 9.—Panel: Van Meckenen.

Fig. 6.—Panel: Van Meckenen.

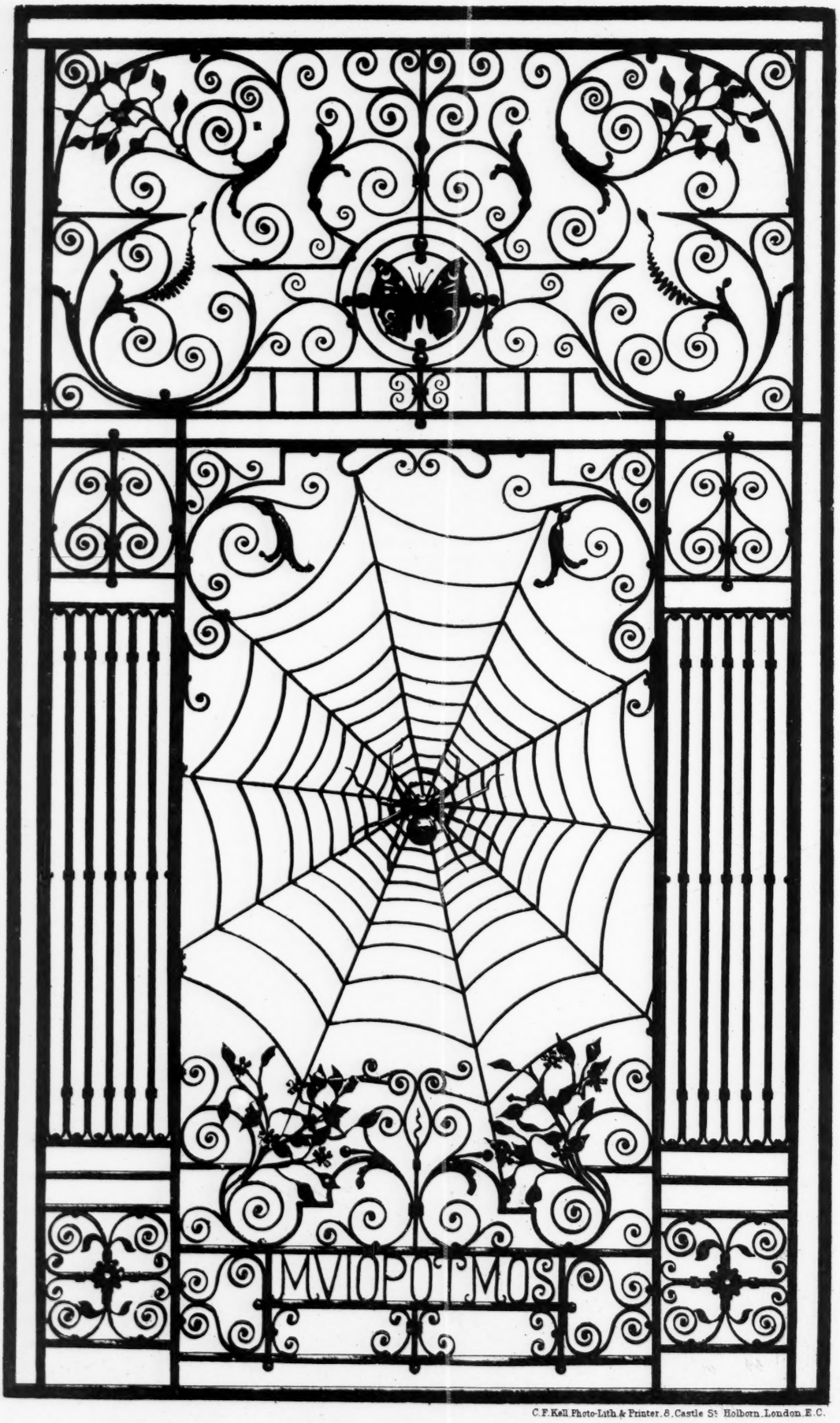
DECORATIVE WORK OF THE EARLY GERMAN ENGRAVERS. *(See Article in this Number.)*

PHOTO. PRINTING CO. LD.

Fig. 8.—*Panel: Van Meckenen.*

DECORATIVE WORK OF THE EARLY GERMAN ENGRAVERS. (*See Article in this Number.*)

No. 1.

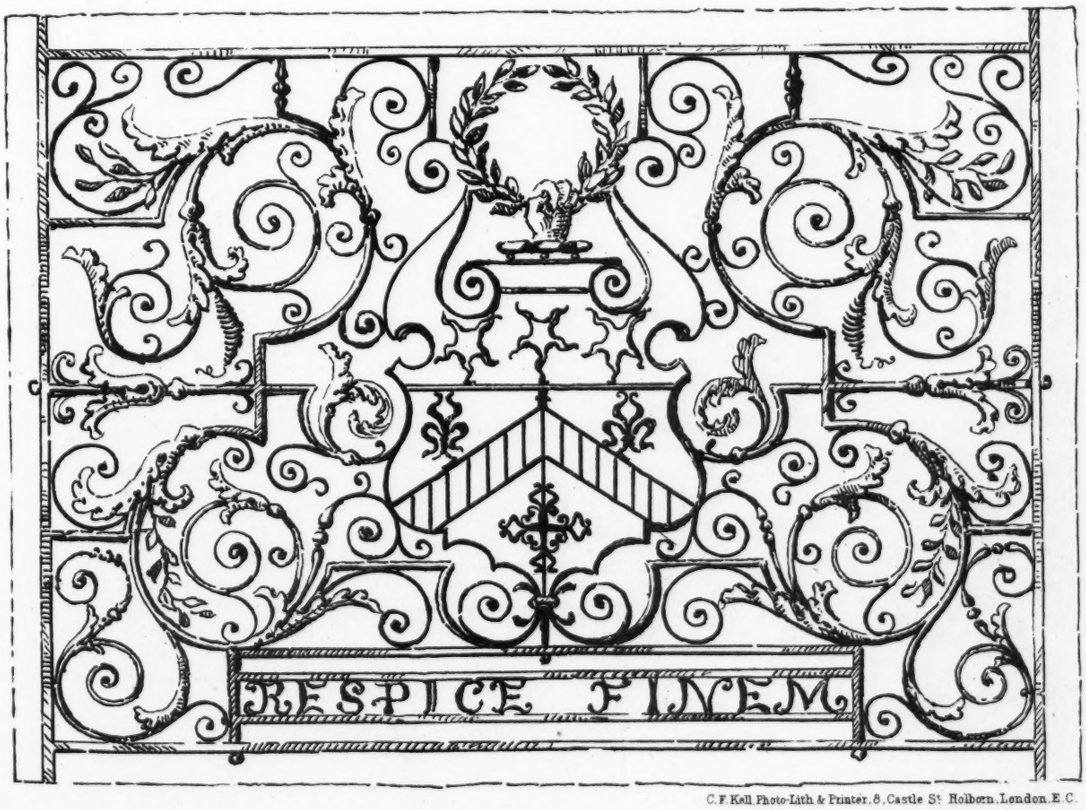


C.F.Kell Photo-Lith & Printer, 8, Castle St Holborn, London, E.C.

WROUGHT IRON GRILLE, EXECUTED BY MESSRS. A. NEWMAN & Co.

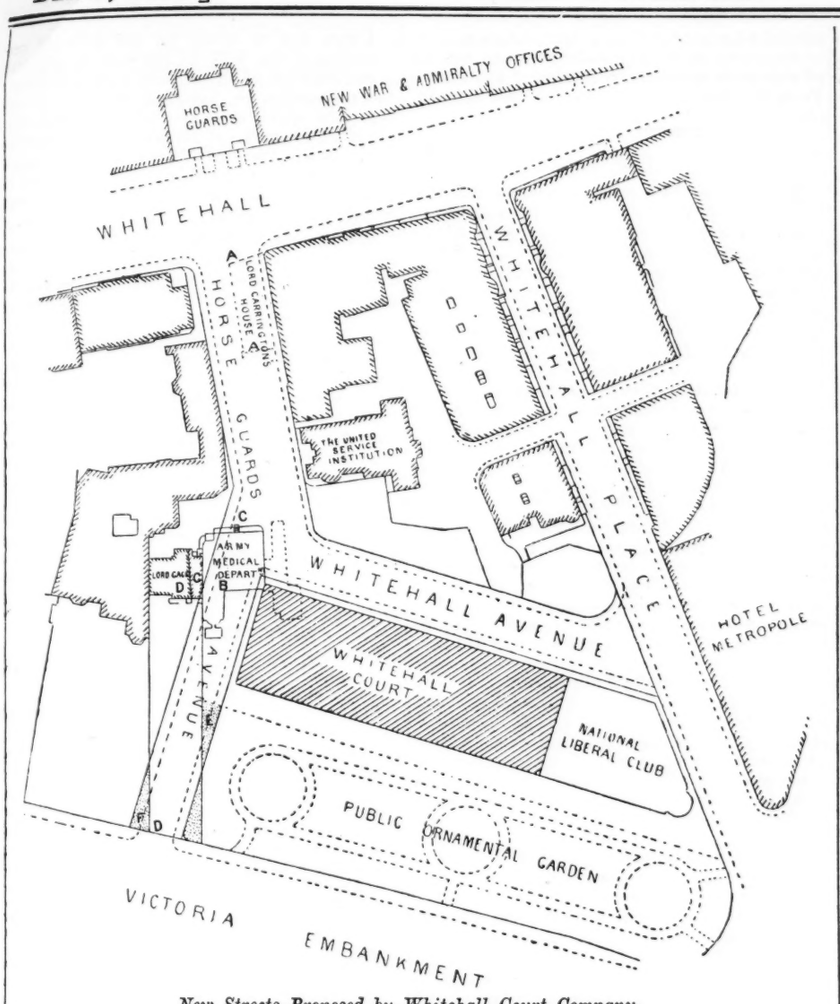
No. 2.

No. 3.



C. F. Kell Photo-Lith & Printer, 8, Castle St. Holborn, London, E.C.

WROUGHT IRON RAILINGS AND PANEL, EXECUTED BY MESSRS. A. NEWMAN & CO.



New Streets Proposed by Whitehall Court Company.

PROPOSED NEW STREETS AT WHITEHALL.

THE accompanying plan shows the proposal which the Whitehall Court Company make for driving new streets through between Whitehall, Whitehall-place, and the Victoria Embankment. The scheme includes the removal of Lord Carrington's house (A), the house occupied by the Army Medical Board (B), and Whitehall-yard (C), occupied by various tenants; and the acquirement of Lord Gage's house and garden (4, Whitehall-yard), and of the two small triangular bits of land marked E and F, and belonging respectively to the Public Gardens and the Board of Trade. The Company have been able to secure the co-operation of the Treasury and of the Office of Woods and Forests, chiefly owing to the fact that the approach is nearly identical with that recommended in the Report of the Thames Embankment Commissioners in 1861. The company are applying for an Act for the carrying out of the scheme, which will probably not meet with any material opposition, as it is undoubtedly a public improvement. The Board of Works, we understand, have hitherto declined to entertain any idea of contributing to the scheme, on the ground that it is not one for the expenditure of public money. As the new approaches are absolutely vital for the objects of Whitehall Court, this seems a reasonable view to take. It is a pity that Horse Guards Avenue could not be laid out exactly central to the Horse Guards front, instead of being slightly south of the centre, as the plan shows. It seems a small irregularity on the plan, but it will make a great difference in the effect.

A Revised Award at the Inventions Exhibition.—We are informed that the Jury Commission have awarded Messrs. William Woollams & Co., of High-street, Marylebone, a Silver Medal for their patent "Embossed Flock Papers, Embossed Leather," and "Tergorine," in lieu of the Bronze Medal awarded to them by the jury for "Embossed Leather and Tergorine."

DISTRICT DRAINAGE AND HOUSE CONNEXIONS.

IN the districts of those Local Authorities along the Thames Valley which have adopted and have in full operation a separate scheme of sewage disposal of their own, the vexed questions have been frequently raised, and in some instances the magisterial opinion has been taken on them, whether a Local Board can, under any circumstance, compel an owner of property to connect his house-drains with the general sewer or system of the district; and if so, what is the condition of things in reference to the drainage of any house which entitles a Local Board to charge the owner the cost of the work of connexion, or to lay the burden of such cost on the general rates of the district. It is universally admitted that the Public Health Act gives full and ample powers to Local Boards, as Sanitary Authorities, to remove or remedy, after the legal notices have been disobeyed, any nuisance arising from drains or otherwise, and to recover, in a summary manner, the cost of such work from the owners. There is plain sailing for local public officials and magistrates in cases where a nuisance is proved to exist. But an owner of property may naturally ask himself the question, "If I have, in the words of the Act, 'a drain sufficient for the actual drainage' of my house, even though it drain into a covered cesspool some distance from the house, and periodically cleaned out in the way prescribed by the Act, why should I be called upon to pay the cost of connexion with the Local Board sewer?" It is admitted, apart altogether from any argument as to the merits or demerits of the cesspool system, that the Public Health Act does not expressly condemn it, even in urban districts or towns. Hence there is difference of opinion even among authorities as to whether a Local Board can demand connexion with its sewers at the cost of the owner, where his house is already effectually drained by a properly kept cesspool. In a case just heard before the magistrates at Brentford, where a new drainage system has not long since been completed, an owner of two cottages was summoned by the Local Board for payment of the cost of making the connexion to the public sewer. Proceedings were taken under the 23rd section of the Public Health Act, which provides that "where any house within the district of a Local Board is without drains sufficient for effectual drainage, the Local Board shall, by written notice, require the owner or occupier within a reasonable time specified to make a covered drain or drains, emptying into any sewer which the local authority are entitled to use, which is not more than 100 ft. from the site of the house; but if no such means of drainage are within that distance, then to empty into such covered cesspool or other place, not being under the house, as the Local Board may direct." The cottages in question, drained by cesspool, were only 14 ft. from the sewer; so that the sanction which the Act here gives to the existence of cesspools did not apply to this case. But it was contended that there was a drain sufficient for the effectual drainage of the cottages, and that the defendant could fairly shield himself under the 24th section of the Act from payment of the sum sued for. That section provides that "where any house within a district of a Local Board has a drain communicating with any sewer, which drain, though sufficient for effectual drainage of the house, is not adapted to the general sewerage scheme, or is in the opinion of the Local Board otherwise objectionable, the Local Authority may, on condition of providing a drain or drains as effectual for the drainage of the house, and communicating with such other sewer as they think fit, close such first-mentioned drain"; the section further providing that the Local Board charge the general rate of the district with the expenses of such work. It was argued, on behalf of the Local Board, that this section only referred to cases where the Board, having adopted and enforced connexion with one effectual system, had changed it for another; and where the Board could not call upon the owners to make fresh junctions. The circular of the Local Government Board interpretive of this section was quoted in confirmation of this view. The Local Government Board state that the 24th section empowers Local Boards to close any existing drain or drains on condition of providing others equally effectual and communicating with the new sewer. It must be said that the fact that this section only deals with the contingent or circumstance of a drain effectually draining "into any sewer," and not into any cesspool, brook, or ditch, would seem to give strength to the argument that the section only refers to cases where the Local Board replaces one public scheme by another, in which also there has been a public sewer. But no less an authority than Mr. Lumley, Counsel to the Local Government Board, seems to hold that this 24th section applies to houses built before the Local Board had established its own sewers; and if that interpretation be correct, it seems evident that Local Boards can make the connexions where houses are already effectually draining "into any sewer," and charge, not the owner, but the general rates with the expense. It seems equally evident that as a cesspool brook, or a ditch cannot fairly come under the description "any sewer," the Local Board can abolish all draining into cesspools, brooks, and ditches, and establish connexion with their sewers, at the expense, not of the general rate, but of the private owners. The Magistrates at Brentford decided that the case above mentioned did not apply to the 24th section, inasmuch as there was no previous draining "into any sewer," but they did not give the Local Board the costs in the case as there was much doubt surrounding the true meaning of the 24th clause. It is important to observe, however, that Local Boards all over the country proceed on the assumption that they have full powers to charge the owners of houses built before the establishment of the Boards' sewers with the cost of the drain connexions, and without being called upon to distinguish between cases where the houses are already effectually drained "into any sewer," and those efficiently drained into a cesspool, brook, or ditch. But this assumption is likely to be disturbed by the conflicting opinions of authorities on the points above mentioned. It has generally been contended that as all sewers, sooner or later, unless they empty into a distinct drainage system, find their outlet in some open ditch or waterway, the expression "any sewer" does not relieve the owner of the cost of connection in such cir-

cumstances. At Twickenham lately complaint was made to the Local Government Board by a ratepayer, of the emptying of cesspools on a neighbouring property; and the fact that the Local Board have called upon the Central Authority to say whether cesspools can be removed in a Local Board District which has a drainage scheme, illustrates the doubt which exists in regard to these subjects. It is to be hoped that the Local Government Board will give some guiding opiuion on the matter.

SCREW-MAKING.

If a strip of paper be wound round a shaft of wood,—say a lead pencil,—at an angle, it will be found that its edges fall into a position resembling the threads of a screw. This was, indeed, the method formerly used for originating the large screws used in machinery. A piece of paper was cut into the shape of an inclined plane, *i.e.*, a right-angled triangle, the height of which corresponded to the length of the shaft of the intended screw, and the hypothenuse to the inclination or pitch of its threads. This was wrapped round tightly and pasted to the shaft, and a nick made with a file along the spiral line formed by its edge, the indentation being afterwards deepened until from the incipient worm a nut could be formed, which served as a holder or guide for the cutters that were to complete it. After the pattern-screw was made, any number of copies could be produced from it; but it was often a matter of importance to get a true thread of a new size or pattern, and many were the contrivances adopted for the purpose. A workman at Soho employed the following modification of the paper method:—He first of all turned his cylindrical shaft perfectly true, and then cut a strip of paper of the same length, whose width would just encircle the shaft when pasted round it, the edges coming together accurately. Before pasting it on he had marked it with a series of diagonal lines, drawing them from points made by compasses along the sides at intervals equal to the distance which one thread of the screw was intended to traverse. When it was cemented to the shaft, these lines ran into each other and formed a continuous thread along which he made a series of indentations in the metal by means of a centre punch and hammer, afterwards connecting them with a file. We may readily conceive that this method would admit of greater nicety of manipulation than the last, because there would be only one thickness of paper to cut through before reaching the iron. When he had produced a roughly-formed thread, he suspended the shaft in a box properly contrived, and cast round a portion of it a block of lead, the impressions in which served as cutter guides. A ruder method was to wind a piece of iron wire obliquely round the shaft, and form a mould from it by compression, with the same object of getting a guide for the cutters. A more scientifically elaborate, though still primitive, method of originating screws is described in the "Philosophical Transactions." Two straight edges are fixed parallel to each other upon a table, the distance between them being exactly equal to the length of the screw-shaft. Their own length must be equal to as many circumferences of the shaft as the thread is intended to traverse it, which depends, of course, upon whether the screw is intended to have a slow or a quick pitch. Thus, if the screw is to advance 1 in. in a complete revolution, and the shaft be 10 in. long, the length of the parallel straight edges must be ten circumferences of the shaft. A third straight-edge is now fixed diagonally between the other two from end to end, and its angle in that position is precisely that of the thread proposed to be made. In the upper edge of this cross-piece a groove has been cut, and a strip of Bristol board inserted, which is smeared with printer's ink. The smooth shaft is now made to roll evenly between the parallel uprights, over the diagonal, which prints upon it a regular spiral line, which the workman can follow with his tools. As the mechanical arts advanced it became easy to cut a correct thread in a lathe, without any guides or previous marking, the only requirements being that the cutter should be fixed at the proper angle, and that its rectilinear motion along the shaft should bear the same relation to its revolution as the pitch of the thread does to its circumference. Beautiful screw-cutting lathes are now constructed in which, by the substitution of wheels of different radii, these relative motions can be so adjusted as to cut threads of any pitch upon shafts of almost any size.—From *The Technical Educator* for December.

WESTMINSTER HALL.

Sir,—I fear from recent notices tha the treatment of Westminster Hall according to Mr. Pearson's plan has not met with unanimous acceptance as the best solution of this architectural problem. Doctors will differ, and it is not to be expected that any treatment could be planned which shou'd satisfy all. Some there are who would make a point of conserving the old buttresses exactly as they are, in their crumbling condition, with their scraps of broken brick and tile and forlorn patches of cement, only adding, perhaps, some props and plasters to sustain them for a few more uncertain years. To them all the remaining architectural and old historical interest would otherwise be obliterated, and for ever. Others there are who would straightway abolish the buttresses altogether, with all traces of their former construction and relation to the building, and would even consign to oblivion the western side of the Hall, carefully concealing it from the public gaze as an incongruous, unfortunate, and impertinent element alongside the modern façade of the greatest architectural work of modern times. A scheme by which the existing state of things when the Hall was reconstructed by Richard II. may be reinstated must, according to them, be entirely subversive of all its historic interest, whatever might be left of its æsthetical or architectural character. Some look upon the space occupied by the screen wall as hopeless waste of a grand site. They would make light of the accommodation to be afforded by the rooms to be provided under the scheme. Others, again, consider that this utilitarian element is wholly condemned by the re-introduction, into the Hall, of staircases by which the rooms would be approached, as though its grand and spacious interior would be frittered away by such utilitarian accessories.

There may be, and doubtless there is, much to be said on the side of these objectors. But in these days of rampant negation, it is refreshing to find a scheme propounded which appears to meet the positive and special requirements of the case, as I unhesitatingly maintain Mr. Pearson's scheme does. It may be called facetiously a scheme "for picking up spilt milk" when he would rehabilitate this front with anything approaching to its former character, the indications of which are perfectly unmistakable. But I have heard of no other scheme which would transmit to the same extent, and with equal certainty, this historical record of the past, architecturally, æsthetically, and, it may be added, without sacrifice to the sentimental interest which vast numbers, indeed the public generally, entertain in this building.

The replies quoted from Mr. Pearson's evidence, to questions asked with all the specious arts and aims of special pleading, to the effect that the main object which he had in view, in making his plan, was the preservation of the remains of the old Norman wall, must be interpreted not only with the context, but with his well-known opinions and views, expressed even in the report itself. He always maintains, and here he expressly states, that his principal object was the representation of the existing aspect of the Hall when reconstructed by Richard II. It is true, he adds also, that by this plan the preservation of the Norman remains would be secured. By his plan this great object would be obtained equally with the other. He would not be a party to the needless destruction of the old remains; but he all along made the resuscitation of the old west side the ruling principle and feature of his design. He would show to the nation that its present insignificant appearance is due, not to its original design, but to its present degraded state and the obliteration of its principal features, and to my mind he merits the universal thanks of all who may have a true appreciation of the building, which used to be regarded as almost the greatest of our secular remains of antiquity.

I trust that we shall yet be saved from the obliteration of this portion, whether through a laudable desire for modern architectural display, on the one hand, or through an insane and over-wrought conservationism (or from its counteracting influence) on the other.

I care not so much for the proposed surrounding of the Hall on the western side with a continuation of the modern buildings, if only the restoration be faithfully carried out, and access be given even by a narrow court, that its interest may not for ever and at once be lost. It will then have lessons still to transmit to futurity, which we should not be justified in sacrificing to any modern lack of reverent respect for antiquity. William White.

*** We print Mr. White's letter (which we take to be a protest on behalf of Mr. Pearson's views) with pleasure, but we entirely fail to see what are the "lessons to posterity" to be conveyed by carrying out the scheme, except that a nineteenth-century architect was content to destroy the area of the Great Hall by two flights of steps, to get to rooms which are to be built only because there is evidence that some kind of rooms were once there, the detail being almost entirely conjectural, as the evidence shows. We would prefer to see Mr. Pearson's "restoration" carried out as a mere piece of effect (though we do not at all admire it), rather than see it made the pretext for inconvenient and ill-lighted committee-rooms, to be got at only by spoiling the area of the Great Hall; and if ever a commencement is made of those steps, we expect the public opinion will be the same.

THE COST OF THE CIRCULAR HOSPITAL AT ANTWERP.

Sir,—So much discussion has taken place as to the cost of this hospital that the following official statement of the actual expenditure, kindly sent me by the able and courteous Secretary General of the Administration of Civil Hospitals, Antwerp, M. Ern. Bouwens, cannot fail to be of interest. The letter is dated Administration of Civil Hospitals, Antwerp, November 27th, 1885, and M. Bouwens writes:—

In compliance with the wish expressed in your letter of the 20th inst., I have the pleasure to send you, on the second page, a detailed statement of the various items and works of the Stuyvenberg Hospital, with the cost of each.

The total number of patients' beds in this institution is 468, made up as follows:—

Each large ward contains 24 beds on the ground-floor and 24 beds on the first floor (in eight pavilions)=8×48	384
Each of six service pavilions (isolation rooms) contains five beds on the ground-floor, and five beds on the first floor=6×10	60
Paying patients' wards (24 rooms, with one bed each)	24
Total number of patients' beds, exclusive of five cots for children	468

There are, besides, one bed by the operation-room, two beds in each service ward for the hospital attendants (male nurses); nine beds for resident students and superintendents; fourteen beds for servants; and five cots or cradles for children.

Cost of Construction of the Stuyvenberg (i.e., the Civil or Circular) Hospital at Antwerp.

Description of Works (including fees and cost of superintendence).	Cost in Francs.
Competition for production of plans	8,489
Cost of drains	1,985
Foundations	158,631
Elevation: total construction	1,412,501
Boundary wall	123,250
Carpentry and iron-foundry	275,536
Drainage (Lot 2) (ironwork) / Drainage (Lot 1) (masonry) — Pipes and channels for air, water, and soil, urinals, and wash-houses	16,441 / 106,436
Accessories	14,174
Ironwork for heating	55,796
System of heating	213,246
Masonry of do.	32,100
Drainage (Lot 3) (carpentry) / Drainage (Lot 4) (plumbing) — See above, Lots 1 and 2	15,748 / 8,984
Carpentry for laundry	7,871
Baths and installation (carpentry)	19,054
Supplementary buildings	2,007
Gardening	5,000
Enclosing railings	19,409
Paving and accessories	77,003
Ceiling and mouldings (?)	57,583
Laying of gas	19,092
Paving in paths	10,070
Accessories	8,977
Ditto	73,843
Laundry machines	45,000
Painting of buildings	12,544
Installation of baths (baths, pipes, and accessories)	10,920
Laboratory of the Dispensary	17,493
Operation-rooms: heating	7,098
Furniture	51,711
Sundry works in the laundry	9,643
Lifts (?)	31,837
Electric bells	2,010
£117,259, or Frs.	2,931,482
Cost of ground (purchased by the Town of Antwerp) 11,116*l.*, =	277,906

Summary:—

Buildings	£117,259	
Site	11,116	
£128,375 =		Frs. 3,209,388

It will be seen that the building, exclusive of the site, cost 2,931,482 fr., or 117,259*l.*, and that it contains 468 beds for patients, exclusive of six cots for children, so that the actual cost per bed, including every item of expenditure from first to last, is 250*l.* 11s. in round numbers. The architect, M. Van Riel, gave the cost as 278*l.* per bed for 400 beds, including everything except furniture. Mr. Snell, in his book on "Hospital Construction," pp. 83–4, part ii., states:—"From what I could gather at the time of my visit (1882) as to the nature of the proposed works, it did not appear to me possible that the building could be completed for a less sum than about 368*l.* per bed." Mr. Snell has maintained throughout the discussion which has followed the reading of his paper before the Sanitary Institute at Leicester, that 368*l.* per bed was a correct statement of the cost of the Antwerp Hospital. It will be seen, however, from the official statement above given that his figures are very incorrect; that is to say, he has made the cost to appear to be 118*l.* per bed, or something like 45 per cent. more than it has in reality been. At the time of reading his paper before the Sanitary Institute, Mr. Snell admitted that his figures were estimates, and the President of the Section, Mr. Gordon Smith, in closing the discussion, stated, as reported in the *Builder* of October 17th last (p. 550), "Mr. Snell's figures are estimates, and, as I am inclined to think, they are exaggerated." Your readers are now in a position to judge what weight ought to attach to this opinion of Mr. Gordon Smith's on the figures in question.

HENRY C. BURDETT.

SMOKE NUISANCE.

SIR,—My attention as managing director of Thompson's Smoke-consuming Stove and Grate Co., Limited, has been drawn to the letter of Mr. T. C. Sorby in your issue of October 24, 1885, in which he offers some suggestions for the better heating of boilers and other furnaces, and the consumption of smoke.

By one of those strange circumstances which happen at intervals, it would seem that my investigations for the better consumption of fuel have led to the same result as he shadows forth in his communication, and applied by me in the patents I have taken out for heating bakers' furnaces, steam boilers and kitcheners, &c. If Mr. Sorby had had a copy of the specification of our patents before him when he wrote he could not have given a more accurate and faithful description of the construction of our furnaces.

We are now exhibiting at St. Andrew's Chambers, No. 165, Queen Victoria-street, E.C., a kitchener in action constructed on the same principle, and there we show how perfect the combustion of the fuel is, its component parts being entirely utilised in the creation of a stream of heated air, which acts direct upon the ovens and boiler in the same manner that it does on steam boilers or other furnaces; thus we not only gain an immense amount of heating power by the complete combustion of the fuel, but at the same time we show that it has been complete, the chimney-top (to which we have easy access), showing by the entire absence of smoke that no portion of the fuel has escaped in that form, thus demonstrating the perfect power of our furnace as a heat-giver and smoke-consumer; in addition to this, the great saving in the quantity of fuel used is a most important item that must not be overlooked in estimating its value.

Should any one interested in the work of the abatement of smoke nuisance be desirous of seeing the kitchener, we shall be pleased to see him and explain its action.

HENRY THOMPSON.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

6,457, Fastenings for Double Doors. H. T. Gurner.

A catch is pivoted to framework of doorway, and when the doors are open this catch is caused by a spring to press a little forward. A slotted plate is placed over a hole in the door, and a striking plate is fixed on the door. When closed the arm of the catch goes in the hole, and, in closing, strikes against the arm, causing it to project behind the slotted plate. The left-hand door thus cannot be opened until the right-hand door is first moved into position, which will release the catch.

9,803, Rendering Paints, &c., Fire and Water Proof. Sir S. J. Blane.

"White peat" or "Kieselguhr" is subjected to an intense heat and mixed with "slag jelly," made by treating slag with hot acid. This material is mixed with paints, varnishes, &c., and renders them fire, damp, and weather proof. Thus a white paint is made of slag jelly 16 parts, kieselguhr 8, zinc oxide 23, sodium silicate 23, and lime-water 30 parts.

11,345, Vehicle Wheel. B. Poole.

A channel-iron or trough-shaped ring is shrunk on the ordinary wooden felloe, and secured by screws, and indiarubber or other flexible band being afterwards cemented into the channel.

14,316, Preparing Wood for Varnishing, Polishing, Painting, &c. R. Willis.

Powdered glass is made, with a sufficient quantity of varnish, into a thick soft paste, thinned as required with spirits of turpentine or other suitable liquid, and is well rubbed into the pores of the wood. The surplus material is removed, and the wood is rubbed with fine sand-paper, after which it is ready to receive polish, varnish, or paint. Powdered glass of the necessary fineness may be obtained by suspending pounded glass in water, and, after partial subsidence, drawing off the water holding the finer particles and allowing these to settle.

14,430, Artificial Marble. A. B. Joy and J. J. Lewen.

A cast of the object to be reproduced is taken in plaster of Paris mixed with zinc white, and also with finely-flaked mica when it is desired that the cast shall have a crystalline appearance throughout its substance. A small quantity of ochre or other colouring matter may be added to the other ingredients. The cast, when dry, is immersed in a bath of linseed oil for six or seven days, and afterwards allowed to stand in a warm place for four or five days. It is then coated over with a mixture of old refined linseed oil and flake white. The glossy surface may finally be rubbed over with dry whiting.

14,712, Fireproof Building. J. N. Moerath.

The walls and joists are of iron, filled in with cement. It is built upon tubular screw piles, the continuations of which serve as chimneys or heating flues. They are in pieces, bolted together internally, and have external flange rings to support the joists. These are tubular, and may consist of two parallel pipes joined together by bracing straps. They support transverse T-girders, which are joined by buckle-plates. Cement is run on these to form the floors. The walls consist of parallel plates of corrugated iron, filled in with cement. The cement used is made of cork shavings, sawdust, &c., mixed with silicate of soda.

15,460, Making Slabs from Tiles. Boulenger, Paris.

Ceramic wall and ceiling facings are prepared in slabs by fixing together a number of tiles. The tiles are laid in a frame face downwards on a flat surface, and after the backs have been wetted, they are covered with a bed of hemp, tow, or flax. A wire netting, around which are placed four iron bars, is then laid over the whole. Upon the wire netting is laid another bed of tow, dipped in tempered plaster, and finally a layer of plaster is added. When the plaster has set, the frame is removed, the slab is turned over, the face cleaned, and the joints trimmed up, and finished.

NEW APPLICATIONS FOR PATENTS.

Nov. 20.—14,222, J. Taylor, Improvements in Saw Spindles.—14,234, J. Keith, Heating and Ventilating Cellular Buildings.—14,236, W. Macvitie, Adjusting Door Knobs and Handles to Spindles.

Nov. 21.—14,253, C. Garlick, Improvements in Stench Traps for Drains.—14,254, W. Towler, Cisterns for Water-closets, Urinals, &c.—14,271, W. and G. Barker, Improvements in Sanitary Sinks and Urinals.

Nov. 23.—14,321, W. Hucklebridge, Glass Roofing.—14,347, C. Cordon, Apparatus for Propping or Staying Purposes in Excavating, Building, &c.—14,352, P. Winn, Syphonic Apparatus for Discharging Water from Flushing Tanks or Cisterns.—14,353, J. Peckover, Stone-sawing Machines.

Nov. 24.—14,363, B. Clarke, Apparatus for Opening and Closing Lights, Shutters, Ventilators, &c.—14,374, E. Theedam, Chimney Tops or Cowls.

Nov. 25.—14,430, A. Ashworth, Construction of Desks and Cabinets.—14,432, H. Davies, Automatic Indicating Door Bolt.—14,446, J. Armstrong, Reversible Bolts for Locks and Latches.—14,457, Verity and Banks, Improved Pivot and Weather Bar Arrangement for Swing and Reversible Windows, Doors, &c.—14,467, J. Jeffreys, Improved System of Glazing.—14,479, Robinson and Carpenter, Blow-pipe, Lighting Apparatus, and Work Bench combined.—14,484, A. Noble, Ventilating and Chimney Cowls.

Nov. 26.—14,493, W. Lilly, Window Fasteners and Sash Fasteners.—14,500, Musselwhite and Prewett, Sash-line Socket.—14,518, J. Ward, Artificial Rockwork and Ground.—14,521, W. Luther, Astragals and Sash Bars.—14,529, W. Heatley and G. Hutchins, Waterproof Non-conducting Coverings for Panels, &c.—14,545, A. Bean, Improvements in Water-closets.

PROVISIONAL SPECIFICATIONS ACCEPTED.

11,692, H. King, Apparatus for Opening and Closing Fanlights and Casements.—11,817, Sanderson & Moffitt, Sash, Door, and Casement Fasteners.—12,529, J. Collier, Appliances for Opening Fanlights, Hinged Windows, &c.—12,700, J. Westmoreland, Ventilation and Construction of Buildings.—12,754, G. Newman, Floor Springs for Swing Doors.—13,039, G. Wishart, Ventilating and Chimney Cowls.—13,097, B. Finch, Ejector Cowl for Chimneys.—13,142, J. & C. Christie, Waste-preventing Flushing Apparatus for Water-closets.—13,329, Beresford & Restall, Water-closets.—13,354, E. Aldous, Improvements in Water-closets, &c.—13,428, G. Kennedy, Apparatus for Coupling Ladders.—13,598, P. Winn, Apparatus for Discharging Water from Flushing-tanks or Cisterns.—13,766, W. Lindsay, Fireproof Floors.—2,718, R. Adams, Self-closing Appliances and Checks for Doors.—11,694, Simmons & Williams, Improvements in Lifts.—12,164, R. Johnson, Combination Ladder and Steps.—12,322, F. Smith, Wind-baffling Chimney Top.—12,547, Verity & Banks, Opening, Closing, and Regulating Fanlights, &c.—12,550, F. Austin, Improved Method of Disinfecting Water-closets, &c.—13,043, C. Cresswell, Improvements in Stoves or Fire-grates.—13,292, H. Denne, Window Fastener.—13,464, H. Johnson, Latches for Doors, Gates, &c.—13,645, A. Brookes, Drain Traps, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

16,696, F. Moore, Firegrates, Stoves, &c.—685, S. von Kosinski, Apparatus for Ventilating, Heating, Drying, and Disinfecting Buildings, &c.—993, T. Palmer, Improvements in Clamps, &c.—1,539, Walker and Worsey, Attaching Door and Other Knobs to Spindles.—8,702, C. Barker, Double-acting Air Pumps.—12,672, J. Cornish, Tiles for Floors of Malt and other Kilns.—1,460, J. Holden, Apparatus for Ventilating and Smoke Consuming.—1,678, A. Marriott, Apparatus for Heating Buildings by means of Hot Water or Steam.—3,604, J. Anderson, Self-regulating Water-waste Preventer.—8,964, A. Boult, Powder or Material for Parquets, Floor Plates, &c.—10,571, D. Keith, Water-supply Apparatus for Washhand Basins, Water-closets, &c.—12,287, A. Lewis, Window-sash Fastener.—12,568, W. Lake, Manufacture of Pigments, Paints, Cements, Bricks, &c., from Iron Ore.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

Nov. 23.

By F. J. Bisley.

Bermondsey—7 and 8, Suffolk-place, 65 years, ground-rent 6*l.* 2s.	£520

Nov. 24.

By A. Richards.

Stoke Newington Green—No. 33, copyhold	810

By W. H. Moore.

Regent's Park—17, Chalcot-crescent, freehold	600
New Southgate—4 and 5, Cromwell-road, 77 years, ground-rent, 5*l.*	125

By Robinson & Fisher.

Piccadilly—34, Albemarle-street, freehold	6,650
96, Jermyn-street, freehold	3,300

By R. Perkins.

Camberwell—27, 29, and 31, Lettsom-street, freehold	715
Southwark, Artillery-lane—A Block of Stabling, 13 years, ground-rent 7*l.*	210

Nov. 25.

By J. Baker & Wilkinson.

Greenhill, near Harrow—A Plot of Freehold Land	250
Kilburn—12 to 15, St. Julian's-road, 79 years, ground-rent 40*l.*	1,440
32, St. Julian's-road, 79 years, ground-rent 10*l.*	450

By W. Holcombe.

Caledonian-road—51, Huntingdon-street, 63 years, ground-rent 7*l.*	585
Kilburn—Ground-rents of 17*l.* 6s. 4d., term 78 years	300

By E. Jackson & Son.

Peckham—17 to 23 odd, Wroxton-road, 91 years, ground-rent 20*l.*	900
67, Westwood-terrace, 90 years, ground-rent 4*l.* 10s.	175

By H. A. Cox.

Bermondsey—1 and 2, Fenner-road, freehold	700
62, Alexis-street, 49 years, ground-rent 4*l.*	265
40, Balaclava-road, 43 years, ground-rent 2*l.* 15s.	280
84, Southwark Park-road, 49 years, ground-rent 5*l.* 17s.	440
164, Spa-road, 33 years, ground-rent 4*l.* 8s.	270
56, Southwark Park-road, 48 years, ground-rent 3*l.*	410

Nov. 26.

By C. C. & T. Moore.

Gray's Inn-road—28, Ampton-street, 29 years, no ground-rent	510
Stepney, Alderney-road—"The Crown," freehold Beer House, a Plot of Land, and 1 to 17 odd, Frimley-street	1,470
2 to 26 even, Frimley-street, freehold	2,055
59 and 61, Alderney-road, freehold	450

By Eastman Bros.

Belgravia—13, Wilton-place, 36 years, ground-rent 6*l.* 6s.	3,000
14, Kinnerton-street, 36 years, ground-rent 3*l.* 13s.	600
Ground-rent of 6*l.* 10s., term 31 years, and reversion for 5 years	145
Marylebone—122, Lisson-grove, freehold	1,160
22, Grove-street, freehold	495
Newington Butts—No. 39, freehold	1,280

By E. Stimson.

Bermondsey—36 to 48 even, Salisbury-place, freehold	1,170
Belgrave-square—2, Chapel-place, 37 years, ground-rent 4*l.*	430
Peckham—5 and 7, East Surrey-grove, 77 years, ground-rent 8*l.* 8s.	405
41, Sumner-road, 77 years, ground-rent 6*l.*	300
Brixton—42 and 44, Rattray-road, 88 years, ground-rent 10*l.* 15s.	595
Pimlico—71, Grosvenor-road, 48 years, ground-rent 9*l.*	600

Nov. 27.

By Robert Reid.

Croydon—7 and 8, West-street, freehold	440
Soho—7, Gerrard-street, freehold	1,410
Euston-road—26, George-street, 23 years, ground-rent 8*l.*	600
Maida Hill—13, 15, and 17, Elnathan Mews, 80 years, ground-rent 15*l.*	770

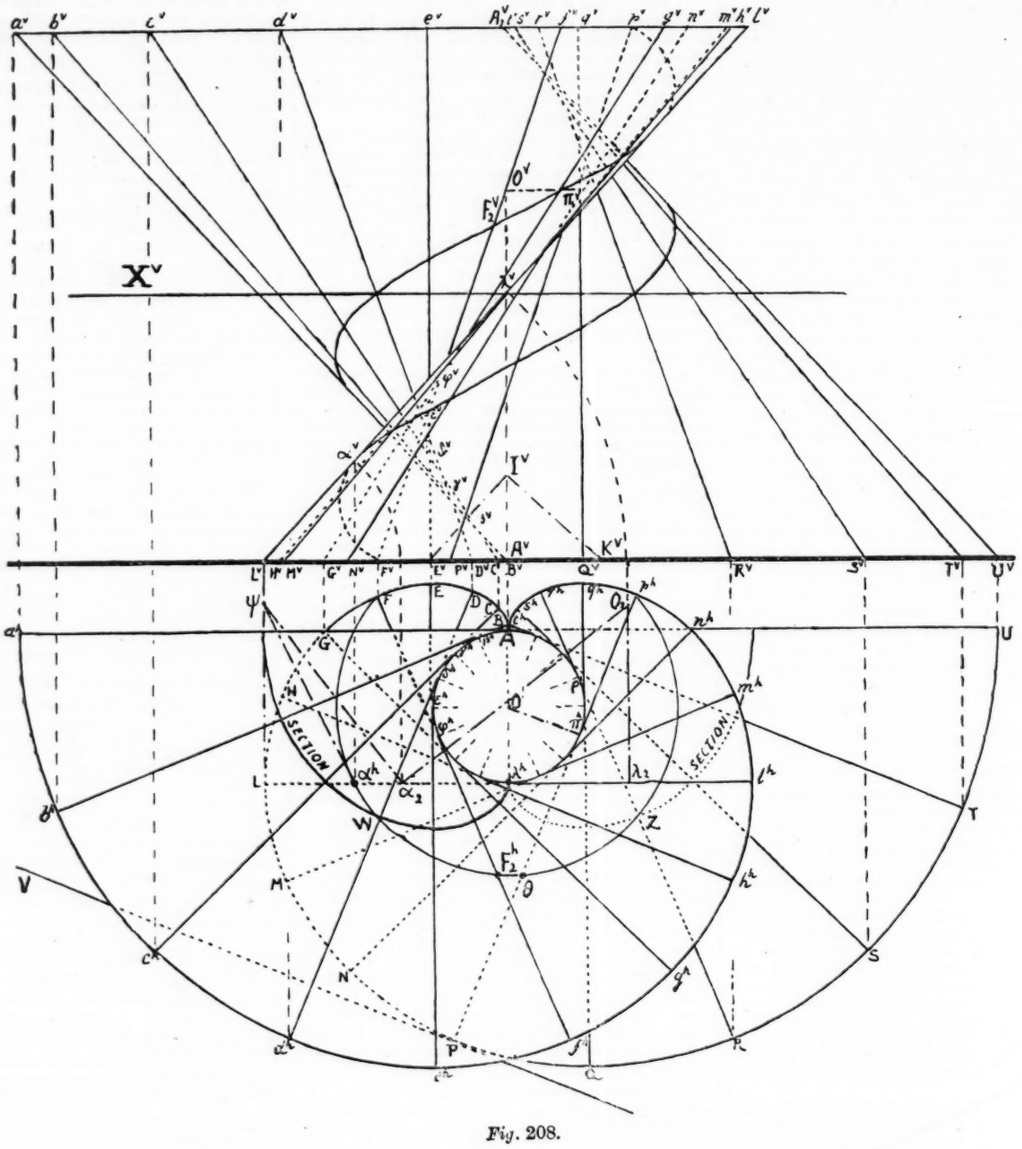


Fig. 208.

The Student's Column.

DESCRIPTIVE GEOMETRY.—Part II.

XXVII.

IN fig. 208 we have drawn the plan and elevation of a developable helicoïd, the height of which is limited by two horizontal planes, viz., the plane of the base, and another plane at the level reached by the helix after one complete convolution.*

We might draw the helicoïd by first delineating the helix, and then producing a series of tangents to it; but there is a much shorter way of getting the generators in which the delineation of the helix is not required.

We can at once determine the foot of each generator on the plan, and also the upper end of the generator where it penetrates the upper horizontal plane which limits our figure. We know that the feet of all the generators are situated on the involute spiral A, B, C, D, E, F, ... formed by taking on the tangents to the base circle the distances $\beta^h B = \text{arc } \beta^h A$, $\gamma^h C = \text{arc } \gamma^h A$, $\delta^h D = \text{arc } \delta^h A$. . . . . We can easily draw the generator Aa which is parallel to the elevation plane, for we know that it will be identical to the transformed helix. If the cylinder were developed, its transformed basis would reach from A to a^h; we have, therefore, only to make the line A a^h equal to the circumference of the cylinder, and we shall have the plan of the generator Aa. As all the generators have the same inclination, they are therefore all of the same length, and we have only to mark the length A a^h on every successive generator to get the curve $a, b, c, d\ e, f$ . . . . the section of the helicoïd by the upper plane. On the elevation the successive intersections of the generators give the elevation of the helix $A^v \beta^v, \gamma^v, \delta^v$, ... , &c.

From our drawing (fig. 208) it is very easy *to construct the helicoïd with cardboard and thread*, and we strongly advise our readers to make this model so as to gain a clear perception

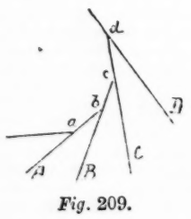


Fig. 209.

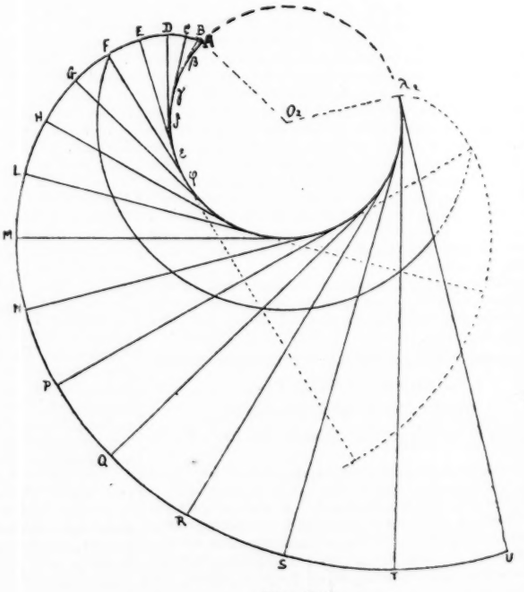


Fig. 210.

* Exceptionally we have used in this figure some capital letters to indicate points, because we have to deal with three points of each generator, and want, for clearness sake, to indicate these three points by the same letter taken from three different alphabets. The foot of the generator is indicated by a capital letter such as D, the point where the generator is tangent to the helix is indicated by a Greek letter such as δ, and the point where the generator reaches the upper plane is indicated by a small letter such as d.

of the appearance of this helicoïd. We take two pieces of cardboard; draw on the one the spiral A, B, C, D, E, ... on the other the upper spiral *a*, *b*, *c*, *d*, *e*, ... and, keeping the pieces of cardboard apart a distance equal to the pitch $A^v A^v_2$ by means of pieces of wood at the angles, we can insert the threads A*a*, B*b* . . . .; these threads will represent the surface. If you cut out the circular eye in the upper piece of cardboard, you will be able to distinctly see through it the helix forming a sharp arris to the surface.

Any horizontal section by a plane, such as, for instance, X, will give the two branches of an involute spiral. One of the branches is formed by the intersection of the generators over their point of contact with the helix: this is the section of the upper sheet of the helicoïd, whereas the other branch is the section of the lower sheet of the helicoïd.

Intersection of the helicoïd by a cylinder concentric with the cylinder on which the directing helix is delineated.

Let the circle F W Z be the base of the concentric cylinder. It is evident that each generator is cut by the cylinder in two points, one below its point of contact with the helix, and the other above that point; for instance, the generator F*f* is cut in F below ϕ, and in F_2 above ϕ. We conclude, therefore, that the concentric cylinder cuts the helicoïd along *two lines*; the one is its intersection with the lower sheet, the other its intersection with the upper sheet.

We observe that for all generators the distances between the points of intersection, such as F or F_2, and the points of contact, such as ϕ, are equal; therefore, the difference of height between the points of intersection of two generators with the cylinder must be equal to the difference in height of the points of contact of these generators with the helix, and we conclude that *both intersections of the helicoïd by the concentric cylinder are helixes of the same pitch as the directing helix.*

The reader will notice as an obvious consequence of the above that, if the generator of the helicoïd be made to slide along the helix on the same point of contact, all the other points of that generator will describe helixes of equal pitch; but, if the generator be made to roll on the helix (without sliding), then each point of the generator will remain in a horizontal plane, and describe an involute of the helix's base.

The helicoïd being developable, we know that a plane tangent to its surface in the point θ will be tangent all along the generator P *p*. The horizontal trace of the tangent plane is a line, P V, tangent to the spiral, M N P Q . . . or, what is equivalent, perpendicular to the generator, P*p*. The lines P V and P*p* contained in the tangent plane sufficiently determine it; but, as P V is parallel to the radius O π, we can also say that *the tangent plane to a helicoïd contains a generator, and the radius of the cylinder at its point of contact with the generator.*

By the above we can see also that all the planes tangent to this helicoïd form the same angle with the horizontal plane, an angle equal to the inclination of the tangents to the helix themselves.

As the tangent plane contains a superficial element of this helicoïd it contains, therefore, two neighbouring generators, or, what is the same thing, two neighbouring tangents to the helix. The tangent plane to this helicoïd is, therefore, also the osculating plane to its directing helix or arris of retrogression.

On the elevation the generators L*l*, A*a*, A_2U form the outline of the helicoïd, for on these generators the tangent planes are perpendicular to the elevation plane.

Development of the Helicoïd.

The helicoïd could be developed by treating the surface as composed of a series of triangles, such as CδD, DεE, EϕF, ... and turning each triangle down one after another; but we have a much shorter and safer method, because we can know beforehand what will be the shape of some of the curves belonging to the helicoïd when transformed by the development of the surface.

When the helicoïd is developed *all the helixes drawn on its surface are transformed into circles.* A few preliminary considerations are required to prove this.

If a curve is divided in equal parts (infinitely small) it becomes a polygon, the sides of which coincide with the tangents to the curve. The angle formed by two of these infinitely small sides is called the *angle of contingence*, for it is equal to the angle formed by the two neighbouring tangents, such as A*b*B or B*c*C (fig. 209).

Now, in most curves drawn on a developable surface, the angles of contingence are altered by the development of the surface, *but the angles of contingence of the arris of retrogression remain the same;* for when (fig. 209), in developing the surface, we turn down the triangle B*c*C round its side B*c*, the angle of contingence of the two tangents does not alter.

In many curves the angles of contingence vary from point to point, but *in the helix all these angles are equal;* therefore, on the developed surface the transformed directing helix, or arris of retrogression, will be a plane curve, the angles of which are all equal. This can only be a circle.

The other helixes, such as those which have their plans on the circle, F, W, Z (fig. 208), have all their points at an equal distance from the directing helix, and must, in the development, be transformed into circles concentric with the circle resulting from the directing helix.

This will help us to develope the helicoïd on one of its tangent planes, such as the plane which contains the lines λ L and L L^v, a plane perpendicular to the elevation plane. The plane selected contains the line λ L, and also the line ψ *a*, the first of which is tangent to the directing helix, and the second of which is tangent to the larger helix projected on the circle F W Z. If we turn down that plane round its trace L L^v we shall get Lλ_2 and ψ a_2 the lines themselves on the plan; those lines will be tangent to the transformed helixes, and we conclude that the centre of the two concentric circles derived from the helixes is on the intersection of the perpendiculars λ_2 O_2 and a_2 O_2. The radius of the smaller circle is λ_2 O_2, the radius of the larger circle is a_2 O_2.

Having obtained this result, we make the development in fig. 210, as follows:—We draw a circle with radius λ_2 O_2, and take an arc of it equal to the length of the directing helix, or, what is the same thing, of a generator such as A*a* in fig. 208. Then we draw tangents Bβ, Cγ, Dδ . . . . to this circle, making the lengths Bβ, Cγ, Dδ . . . . equal to the lengths of the arcs Aβ, Aγ, Aδ, ... of the circle. The spiral A B C D E F G H . . . . will be the transformed section of the helicoïd by the plane of the base. The figure obtained will be the development of one sheet of the helicoïd, the other sheet is represented on our drawing by a dotted line formed by the prolongation of the generators.

We can obtain a model of the helicoïd given with its two sheets, by cutting the developments in paper, glueing them together along the edge of the circle, and winding the circle along the helix delineated on a cardboard cylinder. But the reader will obtain a sufficient idea of a developable helicoïd by winding any paper ring round a thick pencil, for this will give him invariably such a surface.

There is a much faster method of finding the radius of the circle into which the directing helix is transformed. We give it as a practical method, but we will not attempt to explain it, as it is based on algebraical calculations, which we wish to spare our readers. On fig. 208, from E^v we draw $E^v I^v$ parallel to $L^v l^v$, and from I^v the perpendicular $I^v K^v$. The distance $E^v K^v$ is the radius required.

MEETINGS.

SATURDAY, DECEMBER 5.

Architectural Association—Visit to Wandsworth New Workhouse. Train from Waterloo at 2·5 to Earlsfield; 2·19 Kingston Line.

Association of Public Sanitary Inspectors.—Mr. W. Middleweek on "The Dwellings, Habits, &c., and Overcrowding of the Poor in the Metropolis." 6 p.m.

MONDAY, DECEMBER 7.

Royal Academy.—Professor A. H. Church on "Colour and Colours."—I. 8 p.m.

Society of Engineers.—Mr. Philip S. Justice on "The Dephosphorisation of Iron in the Puddling Furnace." 7·30 p.m.

Surveyors' Institution.—Mr. A. D. Wells on "The Cost of Production and the Value received from Farm Crops." 8 p.m.

Royal Institute of the Architects of Ireland (Dublin).—Council Meeting.

Leeds and Yorkshire Architectural Society.—Annual Dinner.

Clerks of Works' Association.—Mr. J. Redden on "Some of the Works of Sir Christopher Wren in London." 8 p.m.

Inventors' Institute.—8 p.m.

Victoria Institute.—8 p.m.

TUESDAY, DECEMBER 8.

Manchester Architectural Association.—Mr. W. K. Booth on "Pupilage." 7·30 p.m.

Institution of Civil Engineers.—Further discussion on Mr. Imray's paper on "High-Speed Motors" and on Mr. Gisbert Kapp's paper on "Continuous Current Dynamo-Electric Machines and their Engines." 8 p.m.

WEDNESDAY, DECEMBER 9.

South Kensington Museum (Lecture Theatre).—Miss J. E. Harrison on "The Mythology of the Iliad as illustrated by Greek Vase Paintings."—VI. 5·15 p.m.

Royal Academy.—Professor A. H. Church on "Colour and Colours."—II. 8 p.m.

Society of Arts.—Professor F. Elgar on "The Load-lines of Ships." 8 p.m.

Liverpool Engineering Society.—Address by the retiring President, Mr. W. E. Mills. 8 p.m.

THURSDAY, DECEMBER 10.

Society of Antiquaries.—Mr. John Parker, F.S.A., on "The Manor of Aylesbury." 8 30 p.m.

Parkes Museum of Hygiene.—Mr. Eric S. Bruce on "Health and the Electric Light." 8 p.m.

Society of Telegraph-Engineers and Electricians.—Annual General Meeting. Papers by Mr. Walter J. Murphy and Mr. H. Kingsford. 8 p.m.

FRIDAY, DECEMBER 11.

Royal Academy.—Professor A. H. Church on "Colour and Colours."—III. 8 p.m.

York Architectural Association.—Conversazione. 7·30 p.m.

Miscellanea.

Lectures at the Royal School of Mines. Prof. Warington Smyth, F.R.S., continuing his lectures on "Mineralogy," in speaking of the importance which was attached by the explorer to the discovery of minerals which were known to be generally associated with the ore of which he is in search, said that this peculiarity was not confined to mineral, but extends to rock formations, certain conditions of the same rock being more favourable to the occurrence of ore than others. It is the business of the miner to become a thorough geologist of the district before he allows his investigations to take a more practical form. It is observed in the North of England, for instance, that a vein is richest in the limestone, in a less degree, but still moderately productive in the gritstone, and becomes greatly impoverished in the shale. The explorer examines the brook courses and the sides of the hills until he identifies one of these beds, and then he has what he considers to be a key to the situation. Another point to be noticed is the fact that gentle undulating hills are always more likely to be productive than rugged heights. If it is believed pretty largely in a certain district, as in Devon and Cornwall, that ore of lead will not be found in sandstone, the chances are that sandstone formations are not frequent in that district. Objection of this kind was long held towards granite, because it was not found productive in the south-west district; but lead ore has been worked successfully for many years in the granite at Wicklow, and also in the province of Jaen in the south of Spain. There are generalisations, however, which are more reliable, such as the greater probability of finding veins in soft rocks than hard. Geologists would not distinguish between them, and yet to the miner this point is of the most vital importance. Physical constitution, as applied to all rocks, is therefore a necessary consideration. Sometimes a large compass needle is useful in determining spots likely to yield ore. In the North of England, perpendicular lodes are generally found to be more productive than others. This, among various facts, has given rise to prejudice in certain districts regarding more or less horizontal lodes, especially if they happen to run into a hill, it being supposed that the weight of the superincumbent mass squeezes the ore out. In other districts the opposite opinion is held, the theory being that little cover is very prejudicial to the existence of ore in large quantities. It is obviously necessary, therefore, in order to become a successful miner, that the characteristic features of various mining districts should be studied, and the prejudices and objections in connexion with each considered.

Architects and Parliament.—Mr. Lewis H. Isaacs, F.R.I.B.A., Surveyor to the Holborn District Board of Works, has been elected M.P. for the Walworth Division of Newington. On the other hand, we regret to see that Mr. J. Dick Peddie, who sat in the last Parliament, has lost his seat.

Steel Shutters.—At the new Tilbury Docks, of which we gave a description a little while ago, the sheds on the quays are to be closed by steel revolving shutters, which are being erected by Messrs. Clark, Bunnett, & Co. (Limited). The steel sheets to be used in their construction, placed end to end, would extend nearly twenty miles, and the quantity of steel springs required for the motive power twenty-four miles.

Technical Art Teaching.—A paper bearing the above title was read on Wednesday evening before the Society of Arts by Mr. F. Edward Hulme. Lord Alfred Churchill occupied the chair. Mr. Hulme commenced his paper with the observation that no one could look back ten years, or even five, without feeling that nationally they had made immense strides in art. It was easy, of course, to sneer at æstheticism as a passing fashion, and certainly some of its eccentricities deserved the ridicule and scorn of all wholesomely-minded people, but when all that was evanescent and unreal should have passed away, they would yet see beneath its frothy emptiness the real strength of the advancing tide. After referring to the services of Mr. Sparkes in connexion with Doulton art pottery, and of Mr. Rawle with the Nottingham lace trade, Mr. Hulme said that he was not so well satisfied with everything as to feel that he needed now but to "rest and be thankful," but he desired to raise his voice in protest against the altogether unjust idea that the schools and system of the Science and Art Department had been proved a failure, and must now be swept aside. So far from that, they had been an incalculable gain to the nation, and it now only required that they should endeavour to graft into their living structure that additional and more technical knowledge that the necessities of the time and of the place demanded. The designer, if he would essay the figure, must have at least as good a knowledge of anatomy as the sculptor or the painter. He again must have a good knowledge of plant structure, and, even if he hesitated to call himself a botanist, must be thoroughly acquainted with the leading laws of plant growth. Model drawing was, in Mr. Hulme's view, a most essential feature in art-education, and its practice could hardly be too emphatically advocated. Another most valuable study was plane geometrical drawing. In this branch of the subject Mr. Hulme said that most geometry books erred through giving the students too many problems, and there was, he believed, still room for a book for busy artisans to be called the "Common-sense Geometry," leaving out all kinds of useless and fancy constructions, and giving only the most useful problems in the most direct way. Architectural drawing also was advocated as a subject of the highest value, and in this respect actual observations and measurements were of the first importance.

R. C. Church at Leek (Staffordshire).—The foundation-stone of St. Mary's (R.C.) Church, Leek, has been laid by the Rev. Dr. Ilsley, R.C. Bishop Auxiliary of Birmingham. The plan consists of a nave and two aisles, a chancel (arranged for surpliced choir), two side chapels, baptistery, confessional recessed in wall of aisle, opening into a small room for priest, fitted with a fireplace; nuns' choir, for the use of the adjoining convent: priests' sacristy, with heating-chamber under; and working sacristy surmounted by a very effective tower and spire, 140 ft. high. The organ-gallery is at the west end, the chancel and side chapels being at the east end. The interior dimensions of the church are 104 ft. long by 50 ft. wide, and the height to the apex of the barrel-roof ceiling of nave and chancel will be 53 ft. 6 in. The exterior elevation of the roof from floor to ridge is to be 64 ft. The columns and responds of nave and chancel arcading, the shafts supporting principals of roof, also the exterior shafts, columns, and bands on spire, will be of red Scotch stone; the rock-faced ashlar is to be of local Hazelhurst stone, and the dressings of Doulting stone. Mr. Albert Vicars, London, is the architect; and Messrs. Barker & Sons, of Birmingham, are the contractors.

Rosslyn-hill Chapel, Hampstead.—The Rosslyn-hill Chapel has recently been enlarged by the addition of a new north aisle, which will increase the accommodation afforded by about a hundred sittings; a new chancel, with vestry and committee-room; and organ-chamber taking the place of the old vestry. The work has been executed by Messrs. Adamson & Sons, of Ealing; the additions being built of Bath stone and Kentish rag facings to correspond with the older portion. They are of similar character, Decorated Gothic, and were designed by Messrs. Worthington & Elgood, of Manchester; Mr. Creed having acted as clerk of the works.

The Pulsometer Engineering Company (Limited) have opened an office at 74, Broomielaw, Glasgow.

The London Pavilion Music Hall.—The new London Pavilion Music Hall, overlooking what was until lately in fact as well as in name Piccadilly-*circus*, was opened on Monday night. We have had an opportunity of looking over the building, which seems to have called forth considerable ingenuity in planning, the most having been made of an awkward-shaped site. The hall itself, with its two galleries, will afford room for about 3,000 persons, and every precaution has been taken for the public safety in case of a sudden panic. There are three spacious staircases to be used for exit only. The hall is provided with a sliding roof similar to that introduced by the lessee, Mr. Villiers, at the Canterbury Music Hall, Westminster-road. The decorations are by Mr. E. W. Bradwell, of Great Portland-street, the work in relief having been executed by the Plastic Decoration and Papier Mâché Company, of Wellington-street, Strand, in fibrous plaster and carton-pierre. The hall, which has only taken four months and seven days to build, has been erected from designs by Mr. J. E. Saunders, F.S.A., and the elevation is by Mr. R. J. Worley. There is to be a restaurant at the corner of the building at the junction of Piccadilly and the new street, but this is not quite ready for opening. The electric-light fittings and gasfittings (which in some instances serve the double purpose) have been made and fixed by Mr. W. G. Cannon, of London-road, Southwark,—in conjunction with the Edison-Swan Electric Lighting Company so far as the electric-lighting arrangements are concerned. The building is lighted up by 310 incandescent lamps each of 16-candle power. The lamps for the different sections of the building are conveniently divided into several separate circuits, and some gas-burners are always alight so as to prevent alarm in case of any accident to the electric-lighting apparatus. The current for the lamps is generated by two of the Edison-Hopkinson dynamos, each capable of sustaining 300 lamps of 16-candle-power, and there are two 16-h.p. Otto gas engines to serve as motive power, so that, in point of fact, the electric lighting machinery is duplicated. The lavatories are provided with Jennings's tip-up basins. The urinals are by Tylor & Sons, and the water-closets are Bostel's patent "Brighton Excelsior." Hydrants, fitted with Morris's instantaneous couplings, with an arrangement immediately adapting them to receive the fire-brigade hose, are placed on the different floors of the building, and the iron columns supporting the galleries are coated with plaster as a protective against injury by fire. In the ceiling over the upper gallery are eight sunburners to assist in the ventilation. Messrs. Peto were the builders.

London.—The Church of St. Michael, Cornhill, was re-opened on the 6th ult., after having been closed for some three months for renovation and repair. The interior of the building (one of Wren's) has been re-decorated throughout, with the exception of the reredos and north porch. In consequence of inadequate ventilation, the paint work and gilding were much deteriorated, and the work of restoration has been carried out by Messrs. G. Trollope & Sons, of Halkin-street, Belgrave-square, under the immediate direction of the architect, Mr. Chas. Reilly, of St. Swithin's-lane. The church was considerably altered and decorated some twenty-five years ago by Sir Gilbert Scott, and (according to the *Citizen*), "care has been taken not to depart from the main features of his work; but a few excrescences have been removed and some highly Gothic features in his treatment have been brought more into harmony with Wren's design." Under the direction of the architect the church has been re-lighted by Messrs. W. Sugg & Co., Limited, of West minster, by the introduction of four sun-burners specially designed for this church.

Birmingham Architectural Association. The first ordinary meeting of the current session was held at Queen's College on Tuesday evening last. Mr. John Cotton (vice-president) was in the chair. The Secretary read a memorial he had received from the Stone Carvers' Association in London, in reference to the detrimental effects of sub-contracting upon the stone carver's art. The following gentlemen were nominated for membership:—Messrs. F. B. Peacock, F. Evans, E. Wilkes, H. R. Bewlay, J. Crouch, J. C. Irvine, and F. B. Andrews. A paper was given by Mr. Tadman Foulkes, entitled "A Few Hints," which dealt mainly with the principal difficulties of the modern practitioner.

The Reform of London Cabs.—It is announced that the promoters of the sixpenny cab service for Birmingham are now turning their attention to London. They propose to start an enterprise which will revolutionise the metropolitan cab service. Our "pet aversion,"—the "growler,"—is to be ousted from the streets by a new four-wheel vehicle which is said to have received the approval of the Scotland-yard authorities, its principle being that the back part will let down, thus making an open carriage of it, while baggage is placed on the top and the front. We are also to be supplied with improved hansom cabs, and with Victorias for the use of ladies shopping or visiting. We are glad to hear it. It may, however, be as well to impress upon the promoters of this enterprise that the great desideratum is an efficient and comfortable closed four-wheeled hackney-carriage. Damp hansoms are decidedly dangerous, and there are very few hansoms which are even tolerable when closed. The "growler" would have been a disgrace to "the year one," and is an incomprehensible example of the survival of the unfittest. The excellent hansoms at present on the streets are all very well for dry weather, but there is an undoubted demand for a good closed four-wheeled cab.—*Lancet.*

The Institution of Civil Engineers.—At the ordinary meeting on Tuesday, December 1st, Sir Frederick J. Bramwell, F.R.S. (President), in the chair, it was announced that the following thirteen Associate Members had been transferred to the class of Members:—A. Brown, R. Davidson, W. C. L. Floyd, S. Horsley, R. H. Lapage, P. T. S. Large, H. U. McKie, R. E. Middleton, D. G. Ottley, H. S. C. Ree, J. G. Single, W. G. Strype, and R. H. Swindlehurst. At the same meeting it was reported that 105 candidates had been admitted as Students. The first ballot for the present session resulted in the election of fifteen Members, eighty-five Associate-Members, and eight Associates. We congratulate the Institution on this evidence of its flourishing condition.

Smethwick.—New Central Schools erected in Smethwick for the Harborne School Board have just been opened. Accommodation is provided for 660 pupils, with lecture-room for science lectures, laboratory, and a school for cookery. The works have been carried out by Mr. G. H. Marshall, builder, of Smethwick, at a cost of about 6,000*l.*, from designs by and under the direction of the architects to the Board, Messrs. J. P. Sharp & Co., of Birmingham.

Proposed Cemetery at Sutton, Surrey.—An inquiry was held at Sutton, Surrey, last week, before Major-General A. De Courcy Scott, Royal Engineers, with a view to an application for sanction to borrow 12,000*l.*, for the purpose of purchasing land for a cemetery, and erecting chapel, mortuary, lodge and entrance-gates, boundary-wall, &c., also purchasing land for a store-yard, and erecting stabling, stores, &c. The plans had been prepared by Mr. James Payne Curtis, A.-M.I.C.E., Surveyor to the Board, who attended and gave details as to the cost of constructiug the various buildings and approaches thereto.

Investments.—Mathieson's "Vade Mecum for Investors," of which the third annual publication has been sent us, gives particulars in regard to almost every concern in which money can or may be invested,—Government securities, stocks, railways, and miscellaneous companies, &c. It is stated to be compiled from official sources. The book appears very complete, and is in a small and convenient compass.

Lynton.—At a meeting of the Local Board of Health of Lynton on the 25th ult., it was decided to call in Messrs. Davison & Davison, civil engineers, of Windsor, to advise them on the drainage of the district, and to prepare the necessary plans and sections, &c.

The Public Health (Metropolis) Bill.—At a recent meeting of the Association of Public Sanitary Inspectors, it was resolved,—"That the consideration of the Public Health (Metropolis) Bill be referred to the Council of this Association, with a view of amending the same, and that practical suggestions (in writing) be invited from all members."

Swanwick.—An inquiry was held at Swanwick last Monday, with reference to an application of the Alfreton Rural Authority to borrow 2,000*l.* for the disposal of the sewage of Swanwick and Leabrooks by irrigation. Mr. W. H. Radford, Assoc.-M. Inst. C.E., explained the plans.

New Purifying Process for Refuse Water.—Experiments were made some time ago at the Kronenberg workmen's colony near Essen (Germany), belonging to the celebrated steel works of Krupp, for the purpose of purifying refuse water from the houses sufficiently to allow of its flowing into a river without danger of the water of the latter being rendered unfit for cleansing purposes. The *Chemiker Zeitung* remarks that this is as much as can reasonably be expected from a process of purification, it being evident that the use of river water for drinking is a remote contingency, against which no special precautionary measures are necessary. The system of purification in question is founded upon the simple fact that all the substances held in suspension by refuse water, and such dissolved substances as have a tendency towards decomposition, can be easily precipitated and decomposed by a relatively small addition of lime and green vitriol. The former is first added, and when it has exercised its full decomposing power, the sulphate of iron completes the process of purification. At the Kronenberg colony this work is carried on satisfactorily by means of two basins, into which the chemical agents are introduced by a simple method. There is an ingenious contrivance for regulating the supply of chemicals, so that it may be in proportion to the quantity of water to be treated. This is effected by the action of a water-wheel, the speed of which is regulated by the volume of refuse-water coming in; this varying at different times of the day, according to the domestic operations going on. The cost of the process is about one-tenth of a penny per cubic mètre (about 35 cubic feet) of liquid treated.

The Sanitary Condition of Wiesbaden. During the earlier part of the autumn reports had been current in the German press to the effect that the epidemic of a typhoid character which had manifested itself at Wiesbaden had been to some extent caused by negligence on the part of the local sanitary authorities. A special commission was named on behalf of the municipality to investigate the matter, Dr. von Pettenkofer being amongst its members. According to the official report which has now appeared, the suspicions as to impurity in the water supply do not seem to have been founded. No truth was discovered in the supposition that the disease had originated from cases having occurred amongst men employed in connexion with the water supply works then being finished. The commission reports that the disease existed in the town before the suspected water supply was in working order. Moreover, the irregular course of the epidemic, as regards the localities attacked, precludes the establishment of a definite accusation against the authorities responsible for the water supply. On the other hand, the commission has traced a connexion between the epidemic and the pollution of the ground, as well as the close manner in which the town is built. The arrangements for dealing with fæcal matter are considered to be in need of revision, as the system of pits is undesirable. The treatment of refuse-water from houses is also considered to require improvement. Excessive closeness of building is a point demanding attention as well as the entire question of house construction. The municipality has already commenced preliminary operations in connexion with a thorough reform of the sanitary regulations of the town.

Detection of Escapes of Gas by Electricity.—Arnould's appliance, shown in March at the Paris Electrical Exhibition consists of a battery of chromic acid, the zinc of which when the appliance is at rest is quite outside the fluid. When at work the latter covers both electrodes, and a spiral of platinum wire is brought to a glow. If the dark red glowing spiral is conveyed along a pipe in bad condition, the place where the escape takes place is marked by increased brilliancy of the spiral in consequence of the catalytic action. The end of the apparatus which carries the spiral is enclosed in a metal tissue, and thus the explosive gas is prevented from becoming ignited. An appliance can be added in the day time which gives an alarm when escapes of gas are met with, as the glow of the platinum wire would not be so easily distinguished as at night.

Incandescent Lamps.—Messrs. Woodhouse & Rawson have published a pamphlet on their incandescent lamps, which, though it is essentially a trade circular, contains some useful practical information in regard to incandescent electric lighting.

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....ton	6	10	0	7	10	0
Teak, E.I. ....load	12	10	0	15	10	0
Sequoia, U.S. ....ft. cube	0	2	6	0	2	9
Ash, Canada ....load	3	0	0	5	0	0
Birch ,, ...	3	0	0	4	10	0
Elm ,, ...	3	10	0	5	0	0
Fir, Dantsic, &c.	1	19	0	4	10	0
Oak ,, ...	3	0	0	5	0	0
Canada	6	0	0	7	0	0
Pine, Canada red	3	0	0	4	0	0
,, yellow	3	15	0	5	5	0
Lath, Dantsic ....fathom	5	0	0	6	0	0
St. Petersburg	5	0	0	7	0	0
Wainscot, Riga....log	2	15	0	4	10	0
,, Odessa	3	2	6	3	7	6
Deals, Finland, 2nd and 1st...std. 100	8	0	0	9	0	0
,, 4th and 3rd	6	10	0	7	10	0
Riga	6	0	0	8	0	0
St. Petersburg, 1st yel.	9	0	0	15	0	0
,, 2nd ,, ...	7	0	0	8	15	0
,, white	8	0	0	10	10	0
Swedish....	6	0	0	16	0	0
White Sea	8	0	0	19	0	0
Canada, Pine 1st	18	0	0	32	10	0
,, 2nd	12	0	0	18	10	0
,, 3rd, &c.	7	0	0	10	10	0
,, Spruce 1st	9	0	0	12	0	0
,, 3rd and 2nd	6	10	0	8	0	0
New Brunswick, &c....	5	0	0	7	10	0
Battens, all kinds	4	0	0	13	0	0
Flooring Boards, sq. 1 in.—Prepared, first	0	9	0	0	13	0
Second	0	7	6	0	8	6
Other qualities	0	5	0	0	7	0
Cedar, Cuba....foot	0	0	3½	0	0	4
Honduras, &c.	0	0	3	0	0	4
Australian	0	0	3	0	0	3½
Mahogany, Cuba	0	0	5	0	0	7½
St. Domingo cargo av.	0	0	5½	0	0	7½
Mexican ,, ...	0	0	4	0	0	5
Tobasco cargo av.	0	0	4	0	0	6½
Honduras cargo av.	0	0	4½	0	0	6½
Rose, Rio ....ton	7	0	0	16	0	0
Bahia....	6	0	0	14	0	0
Satin, St. Domingo .... ft.	0	0	0	0	0	0
Porto Rico	0	0	0	0	0	0
Walnut, Italian	0	0	4	0	0	5

METALS.	£.	s.	d.	£.	s.	d.
IRON—Pig in Scotland ....ton	2	2	6	0	0	0
Bar, Welsh, in London....	4	15	0	5	0	0
,, ,, in Wales	4	7	6	4	10	0
,, Staffordshire, London	5	15	0	7	0	0
Sheets, single, in London....	7	10	0	9	0	0
Hoops ,, ...	6	5	0	7	5	0
Nail-rods ,, ...	5	15	0	7	0	0
COPPER—						
British, cke. and ingt. ....ton	45	10	0	46	10	0
Best selected	46	10	0	47	0	0
Sheets, strong....	54	0	0	0	0	0
,, India	48	0	0	48	10	0
Australian, fine cash....	0	0	0	0	0	0
Chili, bars ,, ...	42	5	0	42	15	0
YELLOW METAL....lb.	0	0	4½	0	0	4½
LEAD—Pig, Spanish	12	5	0	0	0	0
English, com. brands	12	0	0	12	5	0
SPELTER—						
Silesian, special ....ton	14	15	0	15	0	0
Ordinary brands	14	15	0	14	17	6
TIN—						
Banca	96	0	0	0	0	0
Billiton	94	0	0	0	0	0
Straits	96	0	0	0	0	0
Australian	93	7	6	94	0	0
English ingots....	97	0	0	98	0	0
TINPLATES—						
IC coke ....box	14	6	0	16	0	0
IX ditto	21	0	0	25	0	0
IC charcoal	16	6	0	21	0	0
IX ditto	24	0	0	26	0	0
OILS.						
Linseed ....ton	21	7	6	21	17	6
Cocoanut, Cochin	30	10	0	31	0	0
Ceylon	27	10	0	0	0	0
Copra....	0	0	0	0	0	0
Palm, Lagos	29	10	0	0	0	0
Palm-nut Kernel	25	10	0	26	0	0
Rapeseed, English pale....	24	0	0	0	0	0
,, brown	22	5	0	0	0	0
Cottonseed, refined	19	5	0	21	0	0
Tallow and Oleine	25	0	0	45	0	0
Lubricating, U.S.	7	0	0	10	0	0
,, Refined	4	0	0	15	0	0
TURPENTINE—						
American, in cks. ....cwt.	1	6	6	1	6	9
TAR—Stockholm ....brl.	0	18	6	0	19	0
Archangel....	0	11	6	0	12	0

CONTRACTS.

Epitome of Advertisements in this Number.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Granite Curb	East Ham Local Board	W. H. Savage	Dec. 8th	ii.
Supply of New, and Purchase of Old Stores...	Great Northern Ry. Co.	*Official*	Dec. 10th	ii.
Broken Granite, Flints, &c.	Barking Town Locl Brd	do.	do.	ii.
Works and Materials	St. George's, Hanover-sq.	G. Livingstone	Dec. 12th	ii.
Paving Works....	Ealing Local Board.....	C. Jones....	Dec. 14th	ii.
Kerbing, Tar-paving, &c.	Lewisham Brd. of Wks.	*Official*	Dec. 15th	ii.
Telephone Poles, &c.	Lancashire, &c. Tel. Co.	do.	do.	ii.
Four Cottages, Boat-house, &c.	Admiralty	do.	Dec. 18th	ii.
Completion of Esplanade Pier	Rochester Corporation	Law & Chatterton	Dec. 19th	ii.
Stoneware Pipe-Sewer	Wimbledon Local Brd.	*Official*	Dec. 22nd	ii.
Sewerage Works....	West Ham Local Board	Lewis Angell....	do.	ii.
Collection, &c., of Dust	Wandsworth Bd. of Wks	*Official*	Jan. 5th	xiii.

TENDERS.

ASHFORD (near Staines).—For drainage and sanitary works at the West London District Schools, Ashford, Middlesex. Mr. Keith D. Young, architect:—

Dicksee & Dicksee	£1,318	0	0 !
Sharpe & Co., Limited	1,315	0	0
G. Roberts	1,313	0	0
A. E. Addis	1,295	0	0
Cooke & Co.	1,265	0	0
B. Wells	1,247	0	0
T. Anthony	1,189	0	0
Neave & Son....	1,180	0	0
A. H. Apted	1,136	14	0
J. S. Halliwell	1,108	0	0
B. Walker	1,051	0	0
J. Riddell	961	13	0
J. Knight	947	0	0
S. Saunders	944	12	0
W. G. Lilly	924	0	0
J. Bottrell	915	0	0
Leslie & Knight	891	0	0
H. C. Belch	890	0	0
North British Plumbing Company...	86)	0	3
Burman & Sons....	859	0	0
Calnan & Co....	842	0	0
J. Newton	839	0	0
W. Nash	835	0	0
G. Bell	827	0	0
G. Gibson	818	0	0
G. Reavell	799	0	0
R. Seed	785	0	0
G. Neal	776	0	0
C. Folliot	769	10	0
T. Nye	748	0	0
Neave & Neave....	727	0	0
W. Johnson, Wandsworth (accepted)	726	0	0 !

BLACKHEATH. — For additions and alterations to "The Dignaries," Westcombe Park, for Mr. W. Claude Johnson. Messrs. Higgs & Rudkin, architects, Bedford-row. Quantities supplied by Mr. J. Rookwood:—

W. Webster	£4,144	0	0
Clarke & Bracey	3,930	0	0
B. E. Nightingale	3,838	0	0
Patman & Fotheringham	3,833	0	0
Macey & Sons	3,798	0	0
H. L. Holloway, New Cross Gate*...	3,483	0	0

* Accepted.

CARDIFF.—For new south block of offices to the Cardiff Exchange Buildings, Mount Stuart-square, for the Cardiff Exchange and Office Company (Limited). Messrs. James, Seward, & Thomas, architects and surveyors, Cardiff and Swansea:—

D. C. Jones, Gloucester....	£6,159	0	0
D. J. Davies, Cardiff	6,000	0	0
C. Burton, Cardiff	5,738	0	0
F. S. Lock, Cardiff (accepted).....	5,316	0	0

DURHAM. — For alterations and additions for the Birtley Co-operative Society for Butchering Department. Mr. James E. Parsons, architect. Quantities supplied:—

John Jennings, Chester-le-Street	£568 2 3
Tyrie & Graham, Gateshead.....	557 14 5
Chipchase & Dobson, Jarrow	544 18 10
Wakefield & Henderson, Gateshead ...	534 3 0
Potts & Moorhead, Leamington.....	525 14 7
Thomas Hunter, Washington	508 12 3
Joseph Burnett & Son, Birtley*.....	495 0 0

* Accepted.

EPSOM.—For the erection of mortuary and bakehouse to Workhouse. Mr. Herbert D. Appleton, architect, Wool Exchange. Quantities by Mr. F. T. W. Miller, Guildhall-chambers:—

		For Oven.
Burrage	£950 0 0 ...	£100 0 0
Balaam	900 0 0 ...	90 0 0
Walker	853 0 0 ...	73 0 0
Bullers	840 0 0 ...	98 0 0
Newman	839 0 0 ...	81 0 0
Potter	829 0 0 ...	80 0 0
Lake & Co.	820 0 0 ...	75 0 0
Newton	819 0 0 ...	105 0 0
Arney....	813 12 10 ...	86 6 10
Humphris....	810 0 0 ...	72 0 0
Grist	808 18 0 ...	72 18 0
Robson	802 10 7 ...	116 16 3
Roberts....	798 0 0 ...	72 0 0
Warr	795 0 0 ...	97 0 0
Evans....	795 0 0 ...	78 0 0
Neave & Co.	793 0 0 ...	72 0 0
Hughes	790 0 0 ...	84 0 0
Leslie & Knight	783 0 0 ...	79 0 0
Sawle....	760 0 0 ...	70 0 0
S. Hards	744 12 0 ...	71 16 0
Killick...	740 0 0 ...	74 0 0
G. Hards	645 10 0 ...	78 19 0

HANWELL.—For new road and sewer, &c., at Hanwell Park, Hanwell. Messrs. Baker & Sons, surveyors, Queen Victoria-street:—

Rowland Bros. (accepted)	£732 0 0

LEWES.—For the erection of detached residence, King Edward's-road (exclusive of foundations), for Mr. Thomas Chatfield. Mr. J. B. Wall, architect, Walbrook:—

James Longley, Crawley (accepted)	£1,203 0 0

LEYTONSTONE.—For building a dwelling-house with addition in Mayville-road Park Estate, Leytonstone, Essex. Mr. W. C. Livermore, architect and surveyor:—

A. Nicholls, Harrow-road, Leytonstone*	£365 0 0

* Accepted.

LONDON.—For pulling down and rebuilding No. 58, Finsbury-pavement, for Mr. S. Soloman. Quantities by Messrs. D. Campbell & Son. Messrs. Theodore K. Green & Son, Finsbury-pavement, architects:—

L. H. & R. Roberts	£2,793	0	0
Hall, Beddall, & Co.	2,790	0	0
Mark Manley	2,577	0	0
Ashby & Horner	2,550	0	0
Sabey & Son	2,517	0	0
R. Aviss & Co.	2,498	0	0
Killby & Gayford	2,472	0	0
Neave & Neave	2,469	0	0
Brass & Son	2,465	0	0
W. Woodward (accepted)	2,390	0	0

LONDON.—For building new coach-house and appurtenances at No. 40A, Devonshire-street, W., for Mr. Thomas Hawkins. Mr. Mark H. Judge, architect:—

H. Toten & Sons (accepted)	£720	0	0

LONDON.—For fittings, 22, New Bond-street, for Messrs. P. Morris & Co. Mr. Alfred M. Ridge, architect:—

Trent Brothers	£475	0	0!
Scrivener	473	0	0
Robinson	434	0	0
Anstey	205	0	0
Roberts (accepted)	192	0	0!

LONDON.—For the erection of drill-shed for the Tower Hamlets Artillery Volunteers, Victoria Park-square. Mr. J. B. Wall, architect:—

Croggon & Co., Upper Thames-street*	£302	10	0

* Accepted.

LONDON.—For alteration to 378, Mile End-road, for Mr. S. Saxby. Mr. J. B. Wall, architect:—

F. Head, South Hackney (accepted)	£195	0	0

LONDON.—For providing and fixing a heating boiler and fittings at the St. Luke's Workhouse, for the Guardians of the Holborn Union. Messrs. H. Saxon Snell & Son, architects:—

Hodge & Son	£304	3	6
Fraser & Co.	258	0	0
Marshall & Co.	215	0	0
Fraser & Fraser	193	0	0
May Bros.	185	0	0

MITCHAM.—For providing and fixing steam boilers, mains, and apparatus for heating; also hot-water supply, cold water mains, and supply firecocks and hydrants, at the New Workhouse, Mitcham, for the Guardians of the Holborn Union. Messrs. H. Saxon Snell & Son, architects:—

Berry & Son	£6,297	0	0
Fraser & Co.	5,102	0	0
Potter & Son	5,047	0	0
Benham & Son	4,869	0	0
May Bros.	4,6.0	0	0

SAXMUNDHAM.—For alterations and additions to Benhall Lodge, Saxmundham, for Mr. Edmund W. Holland. Quantities supplied by Mr. S. J. Thacker. Mr. Henry Hall, architect, Doughty-street, Mecklenburgh-square:—

W. Rowland, London	£5,315	0	0
R. S. Smith, Ipswich	5,186	0	0
Holliday & Greenwood, London	5,143	0	0
Alfred Coe, Ipswich	4,800	0	0
Howard & Son, Halesworth	4,729	0	0
W. H. Gibbs, Leiston	4,607	0	0
George Kenney, Ipswich	4,589	0	0
D. C. Jones & Co., Gloucester	4,565	0	0
Alfred Brown, Braintree	4,548	0	0
John Shillitoe & Sons, Bury St. Edmunds	4,544	0	0
Oliver T. Gibbons, Ipswich	4,536	0	0
T. H. Kingerlee, Oxford	4,533	0	0
George Grimwood & Sons, Sudbury	4,419	0	0
Cutting & Sons, Saxmundham	4,395	0	0
Everett & Co., Colchester	4,340	0	0
Leslie & Knight, London	4,309	0	0
Dobson, Colchester	4,195	0	0
Warming and Hot-water Services, &c.			
Adams & Son	543	0	0

SOUTHSEA.—For additions, &c., to the "Castle Tavern," Somers-road, Southsea. Mr. James W. Stroud, architect, Brougham-road, Southsea:—

H. Jones	£410	0	0
B. Newton	397	0	0
G. Beech	383	12	0
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[All of Southsea, Portsmouth.]

STREATHAM.—For shop fronts and fittings, Streatham, for Messrs. G. Taylor & Son. Mr. James Young, architect:—

Trent Bros. (accepted)	£340	0	0

WALWORTH.—For certain plumber's work and repairs to roofs at the Newington Infirmary, Westmoreland-road, for the Guardians of the Poor of St. Saviour's Union. Messrs. Henry Jarvis & Son, architects:—

Cattell	£297	0	0!
Kiches	223	0	0
Evans	125	0	0
Castle	121	0	0
Wood & Co.	121	0	0
Stephens	117	0	0
Whicher	105	0	0
Nash	96	0	0
Swan & Barlow	90	0	0
Walker	87	0	0
Roberts	79	0	0
Grady	73	10	0
W. G. Lilly, Crown-court, Pall Mall*	73	0	0
Seed	65	0	0!

* Accepted.

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TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

C. D.—A. H.—F. T. P.—F. R. C.—J. H. P.—H. C.—H. H.—C. P. (MS. received).—C. L., Paris.—R. W. W. & Co.—J. L.—R. B., Paris.—J. F. B. (we should not be disposed to trust that process so much as computation from actual observation, because it is dealing with an artificial state of the stream, and formulæ are too inelastic to cover varieties of circumstances in a natural watercourse; that is our view, but "doctors may differ").—"Ventilating Sunlight for Churches" (your signature is illegible).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

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Addressed to No. 46, Catherine-street, W.C.

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